



SCIENTIFIC RESEARCH IN EAST TIMOR PROMOTED BY THE INCT: FOUR YEARS OF EXPERIENCE IN IMPLEMENTING SCIENTIFIC AREAS AND THEIR BENEFITS FOR HIGHER EDUCATION INSTITUTIONS AND MUNICIPALITIES IN EAST TIMOR

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Abstract: In this article, we intend to demonstrate what scientific research in East Timor has been like, as promoted by the INCT. We will present four years of experience in implementing thematic areas and their benefits for higher education institutions and municipal levels. The INCT funded seven (7) scientific investigations in 2019, 16 in 2021, 12 in 2022 and 11 in 2023, totaling 46 scientific studies. This article will present the scientific areas most sought after by researchers, the higher education institutions that have benefited from INCT funding, the municipalities that have hosted scientific research, the research results that have been published in online journals, as well as the researchers' and evaluators' assessment of the INCT's *modus operandi*.

Keywords: Scientific Research; INCT; Timor-Leste.

A Investigação Científica em Timor-Leste Promovida pelo INCT: Quatro Anos de Experiência na Implementação de Áreas Científicas e os seus Benefícios Para as Instituições de Ensino Superior e Para os Municípios de Timor-Leste

Resumo: Neste artigo, pretendemos demonstrar o que tem sido a investigação científica em Timor-Leste promovida pelo INCT. Apresentaremos quatro anos de experiência na implementação de áreas temáticas e os seus benefícios para as instituições de ensino superior e para os níveis municipais. O INCT financiou sete (7) investigações científicas em 2019, em 2021 foram 16, em 2022 foram 12 e em 2023 foram 11, num total de 46 estudos científicos. Neste artigo, apresentar-se-á as áreas científicas mais procuradas pelos pesquisadores, as instituições de ensino superior que beneficiaram do financiamento do INCT, os municípios que acolheram a investigação científica, os resultados da investigação que foram publicados em revistas online, bem como a avaliação dos investigadores, dos avaliadores em relação ao *modus operandi* do INCT.

Palavras-Chave: Investigação Científica; INCT; Timor-Leste.

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Introduction

The National Institute of Science and Technology (INCT) began scientific research around 2019, in the areas of social sciences, natural sciences and technology and innovation. So far, there have been four years of institutional implementation of scientific research. This article will present the number of thematic areas, the higher education institutions that have benefited from the INCT, the municipalities that have hosted scientific research, the research results that have been published in online journals, the researchers, the evaluators and some considerations of the INCT.

Method

Data from the INCT itself was analysed. All successful INCT scientific research in 2019, 2021, 2022 and 2023 and other relevant reports and manuscripts identified were reviewed. INCT key informants, INCT researchers and external evaluators were interviewed.

Results

The INCT funded seven (7) scientific investigations in 2019, 16 in 2021, 12 in 2022 and 11 in 2023, totalling 46 scientific studies. Excel and Word software were used to analyse the data.

In terms of subject areas, the results showed that the first 15%, the second 46%, the third 9%, the fourth 28% and the fifth 2%. In terms of higher education institutions, UNTL participated in 31 per cent of the research, IOB in 18 per cent, ISC in 13 per cent, DIT in 11 per cent, UNPAZ in 5 per cent, MoH in 4 per cent, individual researchers in 4 per cent, UNDIL, UNITAL, IPDC, IPB, ANAAA and the Ministry of Agriculture and Fisheries in 2 per cent each. Concerning the location of the research, the main target was the municipality of Dili, with 54 per



cent of the research, Lautém with 11 per cent, Manufahi with 7 per cent, Ermera with 2 per cent, Bobonaro with 2 per cent and the remaining municipalities with 2 per cent.

Background

East Timor regained its independence on 20 May 2002. Currently, the country lacks an organised administrative structure and has limited qualified human resources to meet the various needs of higher education and scientific research. During the early days of independence, the country depended on external support to provide basic education, health, engineering, agriculture and other services to its population. With the support (financial and resources) of the United Nations (UN) to East Timor, the country was able to slowly and with political and strategic confidence develop the infrastructure and various systems, including formal and non-formal education in East Timor (Central Intelligence Agency [CIA], n.d).

Timor-Leste is a Southeast Asian nation occupying the eastern half of the island of Timor with a population of 1,341,926. The country is situated between Indonesia and Australia with 13 municipalities and a special autonomous administration, 65 administrative posts, 442 villages, and 2,225 hamlets. It is the youngest nation in Southeast Asia at the age of 20 (Rangel, 2022). Recognising science and technology in Timor-Leste has been taught at secondary and higher education levels based on the Timor-Leste education curriculum (Soares, 2019). With regard to scientific activities, the country has always had very limited financial resources. In the case of science and technology in Timor-Leste, Article 4 of Decree-Law No. 23/2014, of September 2014, and the first amendment to the INCT Decree-Law No. 5/2023, of 8 March 2023, approve the statute of the National Institute of Science and Technology (acronym INCT) with the mission of continuously promoting the advancement of scientific and technological activities in Timor-Leste (National Institute of Science and Technology [INCT], 2014 and 2023). To achieve this mission, the INCT has been funding scientific research through national and international

researchers from the country's higher education institutions since 2019 with 7 scientific investigations, in 2021 with 16 scientific investigations and in 2022 with 12 scientific studies. The implementation of this scientific research has depended on full funding from the government of Timor-Leste through the INCT's annual state budget (Timor-Leste National Strategic Development Plan [PEDN], 2011).

The strategic and annual action plan encourages the INCT to announce calls for proposals to the public every year. The INCT has 5 thematic areas consisting of (1) innovation, technology and infrastructure; (2) education, social sciences and inclusion; (3) health and well-being; (4) economy, agriculture, tourism, trade and industry; (5) environmental health, biodiversity and climate change. From 5 thematic areas, the lines of research were expanded to 10 and the study projects to 23. Most of the thematic areas, lines of research and study projects were developed based on Timor-Leste's National Strategic Plan (PEDN, 2011) 2011-2030 and the Sustainable Development Goals (SDGs).

In 2019, scientific studies focussed on education, agriculture, the economy and tourism. On the other hand, in 2021, scientific research focussed on education, tourism and the exact sciences. Furthermore, in 2022, research projects centred on animal health, agriculture, land borders and education. Additionally, in 2023, scientific research centred on education, health, agriculture, the economy and the environment. The research was funded by the INCT's state budget. The four-year research strategies in various scientific areas in Timor-Leste promoted by the INCT (INCT Strategic Plan [PEINCT] 2022-2030, 2022) are a set of experiences that can provide the government, academic institutions and research centres in the country with sufficient information to formulate public policies and academic references. Highlights include the call for scientific research proposals each year, the evaluation of research proposals, the linking of thematic areas, the annual participation of higher education institutions in INCT scientific research and the municipalities that have benefited from INCT scientific research.



Methods

INCT data was collected. The national strategic plan, annual action plan, programme execution and scientific reports were analysed. A bibliographic and online search was carried out. Relevant manuscripts and reports that were identified in the search were reviewed. INCT key informants, INCT researchers and external INCT evaluators were interviewed. The qualitative method through purposive sampling (Ray, 2015), participants in key informant interviews (KIIs) (n = 8) and participants in focus group discussions (FGD) (n = 4) represented a wide range, including INCT key informants, INCT researchers and INCT evaluators. The diverse sample of individuals (see table 1).

List of KIIs	Number of KIIs	List of FGDs	Number of FGDs
National directors of INCT	2	National directors of INCT	0
INCT investigators	3	INCT investigators	1
INCT evaluators	3	INCT evaluators	1
Total	8	Total	2
Grand Total		10	

Table 1 - List of key informant interviews and group discussions (KIIs and FGDs)

Key Informant Selection Criteria

The criteria used to select the key informants were: (1) a key representative as national director of the INCT; (2) having significant experience related to conducting INCT research in innovation and technology, exact and natural sciences, social sciences and inclusion; (3) representing different areas of expertise in innovation and technology, exact and natural sciences, social sciences and inclusion as external evaluators.

Data was collected through questionnaires. Each key informant and focus group discussion took 5-10 minutes to answer the questions and was carried out in the municipalities of Dili and Ermera. All interviews were conducted in English and Tetum. All interviews were conducted in private and the data was only accessed by the person responsible for the gift through the INCT office.

The quantitative method through the descriptive study (Vaismoradi, 2013), the results of scientific research in 2019, 2021, 2022 and 2023 (n = 46) and the results of scientific research were published in online journals (n = 5). The author collected 46 research results available at the INCT office and 5 research publications that are accessible online via the research portal and Google Scholar (see Table 2).

Scientific investigations per year	Number of studies	Some research studies have been published in online journals
2019	7	0
2021	16	2
2022	12	3
2023	11	Still in the process of concluding the report & Manuscript
Total	46	5

Table 2 - Number of scientific investigations per year in 2019, 2021, 2022 and 2023

All scientific reports from 2019-2023 have been collected and analysed. Data collection and analysis was completed. The framework method (Kleine-Bingham et al., 2023) was employed in the thematic areas, higher education institutions and municipalities that were created to code, categorise, analyse and interpret the data using Office tools, Excel and Word.



Criteria for selecting researchers and evaluators

Research projects were received and evaluated. INCT researchers must meet the following criteria: (1) candidates must have a minimum of five years' doctoral degree in the social sciences, technology and innovation and a minimum of five years' master's degree in the case of the exact and natural sciences and five years' professional experience; (2) the research proposal is based on the principal researcher's area of merit; (3) the research proposals must be aligned with the INCT's thematic area, lines of research and research projects; (4) the research teams are a maximum of five people, with gender balance and with encouragement for the inclusion of students; (5) the topic of the research proposal must be based on references from studies published annually by the INCT.

The criteria used for the selection of evaluators (Harvey, 2019) included (1) at a national level, people with a postdoctoral degree or associate/full professor with a relevant area of merit; (2) at a national and international level, as a senior doctorate with more than six years of professional experience; (3) a retired professor from abroad with a relevant area of specialisation; (4) the evaluation can be done in person and via online.

Results of the Call for Proposals and Evaluation Process in 2019, 2021, 2022 and 2023

a. Call for research proposals, evaluation results and implementation of scientific research in 2019

The research proposals received annually by the INCT were registered for subsequent evaluation. The evaluation of the INCT's research proposals consisted of administrative and scientific assessments. The INCT's experiences will be described in each year of scientific research funded by the INCT.

In 2019, the INCT received seventeen research proposals from various researchers across the country. Of the seventeen research proposals that were submitted to the INCT, nine met the criteria. Of the seventeen

research proposals, six research proposals focused on education, two research proposals focused on health and one research proposal was related to natural disasters. The evaluation of research proposals (Powell, 2016) at the INCT consists of the administrative evaluation and the evaluation of research proposals. The administrative evaluation focused on the researchers' requirements to fulfil the criteria used by the INCT to evaluate the administrative requirements. The evaluation of the research proposals was carried out by internal and external evaluators. Thus, of the seventeen research proposals submitted, seven were approved in the evaluation process to carry out research in 2019, as shown in Table 3. The higher education institutions that took part in the scientific research were the Business Institute (IOB), the University of Peace (UNPAZ), the Cristal Higher Institute (ISC) and the Canossa Professional Institute (IPDC).

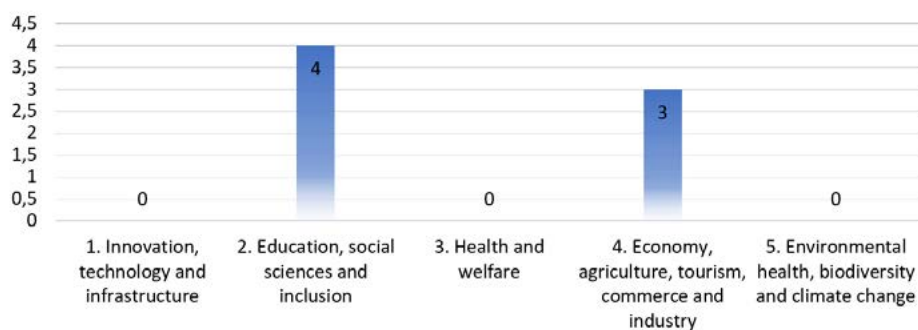


Thematical Area	Research area	Research proposal topic	Academic Institution	Local Implementation
Economy, agriculture, tourism, commerce and industry	Ekonomia	Analiza Strategia Marketing Ba Dezenvolvimentu Negosiu Ki'ik Iha Setor Turizmu Iha Postu Adminsitrativo Atauro, Munisipiu Dili	IOB	Dili
	Ekonomia	Analiza fatores kauza desempregu no governo nia politika atu kombat desempregu iha Timor-leste iha tinan 2017-2019.	UNPAZ	Dili
	Agrikultura	Kompleksidade ba agrobisnis ba agrikultura iha munisipiu lima (Aileu, Aindrao, Bobonaro, Dili no Ermera)	UNPAZ	Aileu, Aindrao, Bobonaro, Dili no Ermera
Education, social sciences and inclusion	Education	Analiza Autoefikasai Akademika, Abilidade Social No Insussu Escolar Iha Ensino Superior Timor-Leste.	IOB	Dili
	Education	As atividades laboratoriais no Ensino secundário (Um estudo caso manuais escola de física do 10ª ano de escolaridade)	ISC	Baucau, Bobonaro, Dili
	Education	Desenvolvimento Material Aprendizagem Folha Traballu Estudantes Bazeadu Inkeritu Giadu Iha Material Reziduo No Jestaun Risku Ba Aprendizajen Iha Ensino Secundaria Jeral Iha Sidade Dili	ISC	Dili
	Education	Analiza motivasaun no estratejia aprendizagem nu'udar fator fundamental ba estudante sira nia susesu husi banku estudu Ensino sekundariu iha Timor-Leste	IPDC	Dili

Table 3. Research proposals approved and realised in 2019

In 2019, the subject area that interested and was applied for by candidates was education, social sciences and inclusion, economics, agriculture, tourism, trade and industry. Therefore, out of seven scientific investigations, the majority focused on the second and fourth thematic areas, as shown in Graph 1. Graph 1 shows the thematic areas that have been the subject of scientific research. Graph 2 lists the higher education institutions that participated in the INCT's scientific research in 2019.

Graphic 1. Thematical Area In 2019

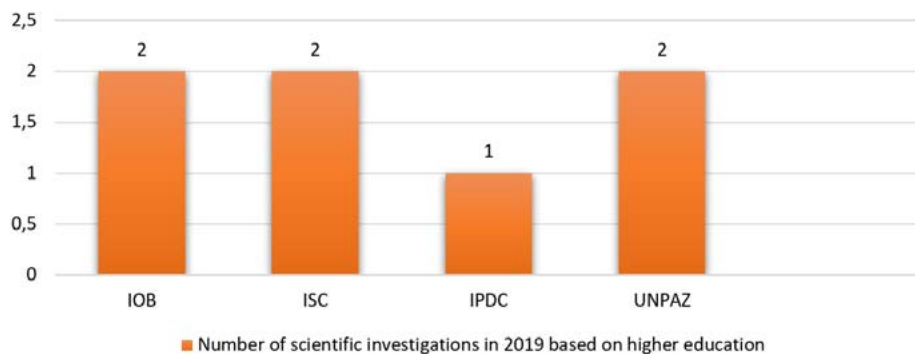


The seven scientific investigations that went through the evaluation process were two scientific investigations in the field of economics, carried out by UNPAZ and IOB. One scientific research in the field of agriculture was implemented by UNPAZ. Four scientific investigations centred on education. Of the four scientific investigations, two were carried out by the Instituto Superior Cristal, one by the IOB and one by the IPDC, as shown in Graph 2.

In the case of research implementation, the National Science and Technology Institute (INCT) has to guarantee the implementation of the research in the field. Therefore, all scientific research implementation was under the control and supervision of the INCT on an annual basis (Powell, 2016).

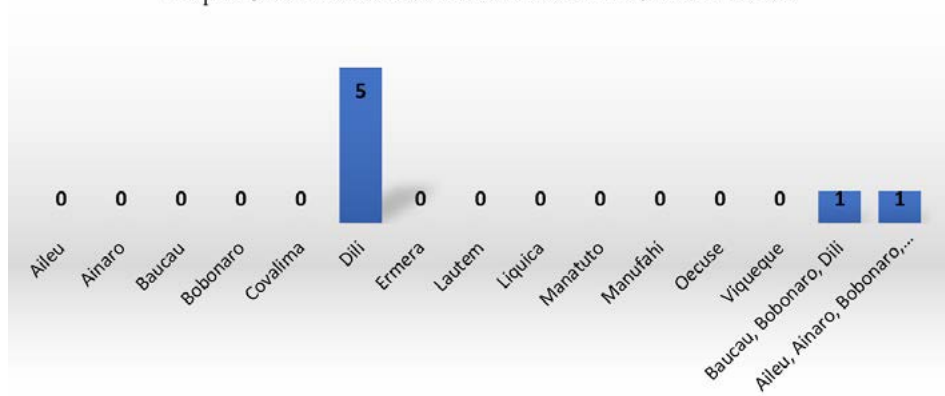


Graphic 2. Number of scientific investigations in 2019 based on higher educations



In 2019, of the 12 municipalities and special administration in the Oecussi region, the municipality of Dili benefited from five scientific investigations. However, the municipalities of Aileu, Ainaro, Baucau, Bobonaro and Ermera also benefited from scientific research, as shown in Graph 3. Several scientific investigations have been carried out and monitored by the INCT.

Graphic 3. Number of research conducted in 2019 based location



b. Call for research proposals, evaluation results and scientific research in 2021

In 2021, twenty-four research proposals were submitted and evaluated by the INCT. Of the twenty-four research proposals, two research proposals focused on innovation, technology and infrastructures, eight research proposals focused on education, social sciences and inclusion and six research proposals focused on economics, agriculture, tourism, trade and industry. Of the twenty-four research proposals, seventeen were approved in the evaluation process. However, sixteen research projects were implemented and one applicant resigned due to the researcher's health problems, as shown in Table 4. The higher education institutions that took part in the scientific research were the IOB, the East Timor Coffee Institute (ETCI), the ISC, the University of Dili (UNDIL) and the National University of Timor Lorosae (UNTL).

Thematical Area	Research area	Research proposal topic	Academic Institution	Local Implementation
Innovation, technology and infrastructure	Information & technology	Analiza estratejia teknolojia	IOB	Dili
		informasaun ba alternativa		
		prosesu aprendizajen akademia presencial, iha pandemia covid-19		
	Innovation	Utilidade kulu Ai (<i>Artocarpus heterophyllus</i>) ba Produtu inovativu Kripik hodi Asegura Siguransa Alimentar iha Suku Talimoro;	ETCI	Ermera



Education, social sciences and inclusion	Education	Identifika fatór-sira ne'ebé halo alunu-sira abandona atividade aprendizajen: Studu kazu ba ensinu eskundáriu iha sidade Dili	ISC	Dili
	Education	Elaboração de conteúdos científico-pedagógicos da disciplina de física para a lecionação do 10º ano de escolaridade no ensino secundário.	ISC	Dili
	Education	Desafios da formação inicial de professores a lecionação da disciplina ciência físico-naturais no 3º ciclo do ensino básico, no currículo vigente – Um Contributo Para A Qualidade Do Ensino De Ciências Em Timor-Leste.	Individual	Dili
	Education	Identifika Fator sira ne'ebé halo alunu sira abandona atividade aprendizajen: Estudu kazu ba Ensino sekundaria iha sidade Dili	ISC	Dili
	Social	Moris hamutuk Konstrui Sosiedade: Dezenvolvimentu Timor-Leste no Integraaun Regionál, Estudu Kazu kona-ba Kapasidade Política Ekonómika no Kondisaun sira Ekonomia assosiadu ba prosesu Integraaun Timor-Leste ba ASEAN	UNDIL	Dili

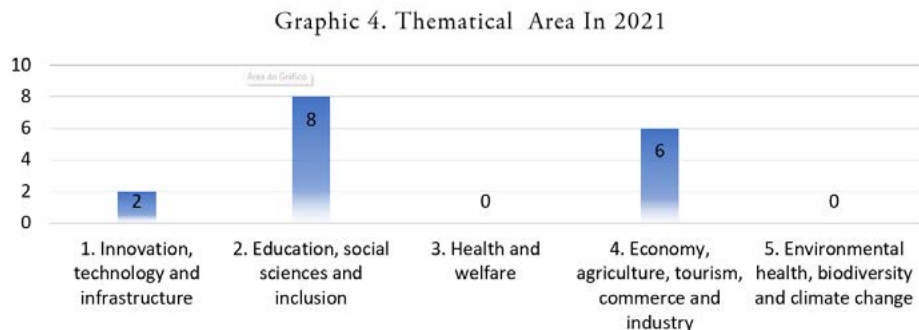
Economy, agriculture, tourism, commerce and industry	Social	Analiza Dezenvolvimentu jeneru no prátika kultura hodi kria partisipasaun feto iha vida ekonomia	IOB	Manatuto & Lautem
	Social	Gender Analysis of Access to Cesta Basica in Timor-Leste	UNTL	Dili and Liquica
	Social	A tradição/cerimônia fúnebre: uma forma de reconhecer e fortalecer o elo familiar	Individual	Lautem
	Economy	Marketing strategy analysis for developing a small and medium enterprises in tourism sector of Manufahi municipality, Timor-Leste.	IOB	Manufahi
	Economy	Impaktu Ezistensia Surtu Covid-19 ho Implementasaun Serka Sanitaria nu'udar variabel moderador ba Rendimentu Negosiante Sira Empreza Mikro no Ki'ik (Estudu Kazu iha Munisipiu Dili, no Munisipiu Bobonaro)	IOB	Baucau & Bobonaro
	Agriculture	Efeito hosi Uza Háre Kulit no Borrás Tofu fermentadu hó Probiótiku ho Baze Marungi iha Dieta atu Hadi'ak dezempeñu Produtivu Hosi Fahi Aman Kastradu	UNTL	Dili
	Agriculture	Prevalénsia Parazita sira no Impaktu Pesti Fahi Afrikan iha Sistema Produsaun Fahi Kiik sira iha Timor-Leste	UNTL	Dili



Agriculture	Effect of efficiency leguminosae production plus maize as feeding on the growth phase of local swine in Timor- Leste (<i>Potamochoerus Porcus</i>);	UNITAL	Dili
	Fatór sira ne'ebé afeta sustentabilidade ba dezenvolvimentu agríkola iha Timor-Leste	UNTL	Bobonaro

Table 4 - Research proposals approved and realised in 2021

In 2021, the sixteen scientific investigations centred on various thematic areas, as shown in Graph 4. Eight studies were in the area of education, social and inclusion; six scientific investigations centred on the economy, agriculture, tourism, trade and industry; and two investigations focused on innovation, technology and infrastructures.



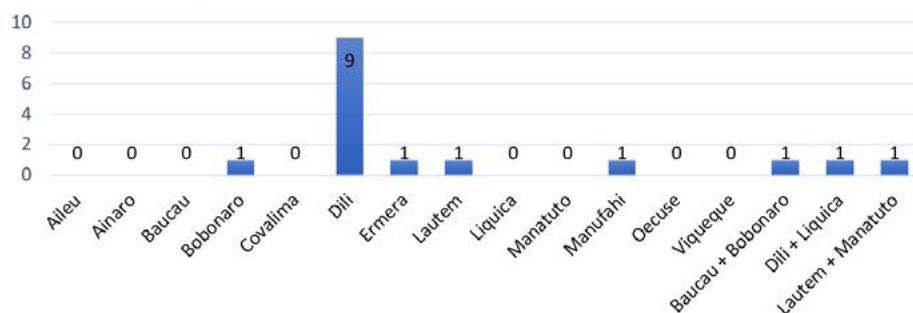
Of the sixteen scientific investigations carried out in 2021, the higher academic institutions that participated in scientific research are those shown in Graph 5. IOB had four scientific investigations, the same number as UNTL, ISC had three investigations, one investigation was carried out by UNDIL, one investigation was carried out by ETCL, one investigation was implemented by the University of East Timor (UNITAL) and another two investigations were carried out by individual researchers.

Graphic 5. Number of scientific investigations based on Higher education Institutions in 2021



The municipalities that benefited from the INCT's scientific research are shown in Graph 6. The capital, Dili, had nine scientific studies, the municipality of Ermera had one (1) study, the municipality of Lautém had one study, Bobonaro had one study, Baucau and Bobonaro had one study, Dili and Liquiçá had one study, Lautém and Manatuto had one scientific study.

Graphic 6. Number of research conducted in 2021 based location



c. Call for research proposals, evaluation results and implementation of scientific research in 2022

Forty-two research proposals were submitted to the INCT in 2022. Of these forty-two proposals, only eighteen research projects met all the requirements of the first phase and were submitted to external evaluators. Of the eighteen research proposals, twelve research applications were approved in the 2nd evaluation phase and went on to implement scientific research in the field, as shown in Table 5. Two research projects focused on



innovation, technology and infrastructures; four research projects focused on education, social sciences and inclusion; one research project focused on the environment, biodiversity and climate change; one research project focused on health; three research projects focusing on the economy, agriculture, tourism, trade and industry. The higher academic institutions involved were the Dili Institute of Technology (DIT), ISC, UNTL, the Betano Polytechnic Institute (IPB) and the National Agency for Academic Assessment and Accreditation (NAAAA).

Thematical area	Research area	Research proposal topic	Institution	Local Implementation
Innovation, technology and infrastructure	IT	Modernização Tecnológica do Setor Público em TL: E-Government	DIT	Dili
	IT	Sistema Jestaun Inundasaun Sustentavel atu Minimiza risku Inundasaun iha Município Dili, Timor Leste	DIT	Dili
Education, social sciences and inclusion	Education	Estudo sobre o Bullying Escolar na Adolescência.	ISC	Dili
	Education	Status of Digital Education Infusion in Higher Education Institution: A case study in Timor Leste	ANAAA	Dili
	Social	Land Illegal Immigration: Problems and solutions	UNTL	Covalima & Bobonaro
	Emigration	Tendências Contemporâneas da Emigração da Camada Jovem em Timor-Leste: Destino, Causas, e Impactos Sociais e Económicos na Sociedade Timorense	UNTL	Dili
Health and welfare	One Health	A prevalência de lombriga da Classe trematode Fasciola spp nos búfalos em Timor Leste.	IPB	Baucau, Bobonaro & Manufahi

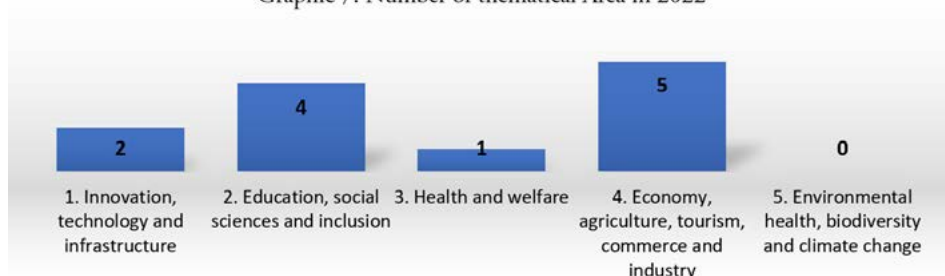
Economy, agriculture, tourism, commerce and industry	Economy	O impacto da Implementação e desenvolvimento do comércio eletrónico (E-Commerce) para as pequenas e médias empresas em Timor-Leste.	IOB	Dili
	Agriculture	Potensia Produsaun Plantas Forrageiras, Kompozisaun Kimika, no Estimativa Capacidade de Cardga (Carrying Capacity) Animais Ruminantes iha Pastagem Nativa Municipio Manufahi hodi assegura Projecto Tasi Mane	UNTL	Manufahi
	Agriculture	Diversifikasaun produktu kafe lokal hodi hasae valor de vendas iha indústria hospitalidade iha Dili.	DIT	Dili & Ermera
	Agriculture	O impacto e a Importância do parque Nacional de Nino Konis Santana para preservação da Fauna: Estudo de Caso no Município de Lautem.	IOB	Lautem
	Agriculture	Efeito husi adubu organiku Feses karau Vaka”Bokas” no Distansia Kultivu ba Productividade Sorgo (Sorghum Bicolor L. Moench) iha rai Vertisol.	UNTL	Lautem

Table 5 - Research proposals approved and realised in 2022

The twelve (12) scientific studies carried out in 2022, with different thematic areas, are shown in Graph 7. Five (5) studies focused on the economy, agriculture, tourism, trade and industry; four (4) investigations centred on education, social, science and inclusion; two (2) investigations were associated with innovation, technology and infrastructure; and one (1) investigation was related to health and well-being.

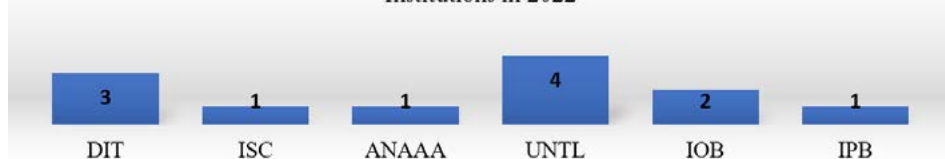


Graphic 7. Number of thematical Area in 2022



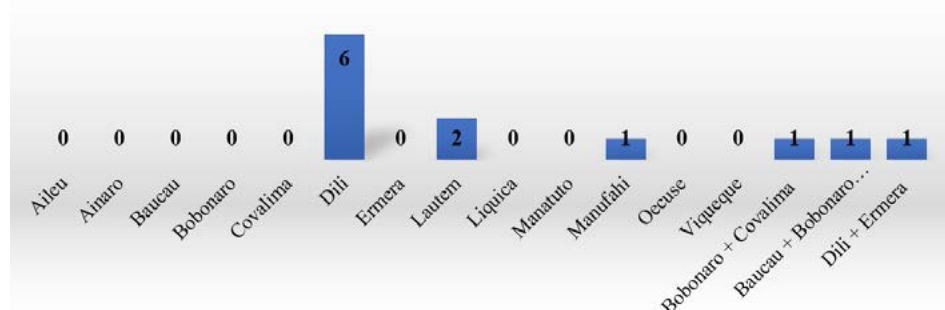
The twelve (12) scientific studies in 2022 involved several higher education institutions, as shown in Graph 8. UNTL had four (4) studies, DIT had three (3) scientific investigations, IOB had two investigations and IPB had one study.

Graphic 8. Number of scientific investigations based on Higher education Institutions in 2022



The municipalities benefiting from scientific research in 2022, as shown in graph 9, are the capital of East Timor, Dili, with six (6) studies, the municipality of Lautem with two (2) studies, the municipality of Manufahi with one (1) study; the municipalities of Baucau, Bobonaro and Covalima with one study; another (1) study in the municipalities of Dili and Ermera; another study was also carried out in Bobonaro and Covalima.

Graphic 9. Number of reserch conducted based on location



d. Call for research proposals, evaluation results and carrying out scientific research in 2023

In 2023, forty-three research proposals were submitted to the INCT, and of these forty-three proposals, twenty-six were selected and approved for the 2nd evaluation phase, which consisted of evaluation by external evaluators. Of the twenty-six research proposals, twelve research applications were approved and went on to implement scientific research in the field, as shown in Table 6. Of the twelve research proposals, one researcher resigned for health reasons.

Thematical area	Research area	Research proposal topic	Institution	Local Implementation
Innovation, technology and infrastructure	IT	Estudo de produção de biscoito nutritivo utilizando o produto local de Timor-Leste como farinha de amendoim, farinha de milho e farinha de soja	MoH	Aileu, Ermera, Manatuto
	IT	Decreasing National imports by Enhancing Productivity and Offering New Products in Timor-Leste (Study Case of “Akadiru” Product)	DIT	Dili & Liquica



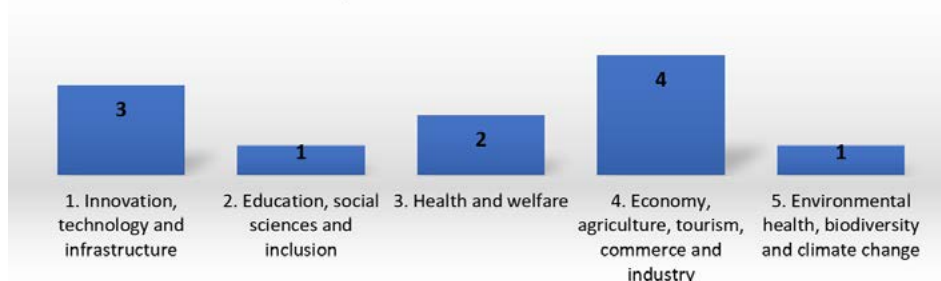
	IT	As Alterações significativas da circulação rodoviária em Díli, Timor-Leste-Identificação dos problemas e resoluções para o tráfico rodoviário na capital de Timor-Leste	UNTL	Dili
Education, social sciences and inclusion	Education	Estudo do Desenvolvimento Curricular no Ensino Básico. Desafios e Soluções	UNTL	Dili
Health and welfare	Health	Prevalence of undiagnosed and associated factors of hypertension among people over 18 years old living in rural Sucos, in Timor-Leste; community based-cross-sectional study	MoH	Aileu, Ermera, Manatuto
	One Health	Formalin identification through imported frozen meat into Timor-Leste	UNTL	Dili
Economy, agriculture, tourism, commerce and industry	Economy	Investigating the effectiveness of preventive measures and policy curbing inflation and protecting household income and consumption in Dili	DIT	Dili
	Agriculture	O efeito do uso da casca café na dieta para melhorar o desempenho produtivo e a qualidade técnica e ambiental na suinocultura.	UNTL	Manufahi
	Agriculture	Designing an Innovative Feed Planning System for Smallholder Bali Cattle (Bos javanius) Farmers in Lospalos, Lautem, Timor-Leste	Ministry of Agriculture and Fishery	Lautem

environmental health, biodiversity and climate change	Agriculture	A Produtividade do Sorgo Bioguma Sob Efeito do Cultivo Intercalado com Diferentes Linhas de Legume Clitoria ternatea cv Milgara e na Produção dos Produtos Caseira	UNTL	Lautem
	Environment	A Gestão de Resíduos Urbanos (Lixo) e Desenvolvimento de Modelos Reciclagem em Díli. Principais Desafios e Soluções	UNTL	Dili

Table 6-Research proposals approved and realised in 2023

Concerning the eleven scientific investigations in 2023, the scientific areas involved are shown in Graph 10. Three studies centred on innovation, technology and infrastructures. One investigation was linked to education, social sciences and inclusion. Two investigations were linked to health and well-being. Four studies were linked to the economy, agriculture, tourism, trade and industry. And one research centred on environmental health, biodiversity and climate change.

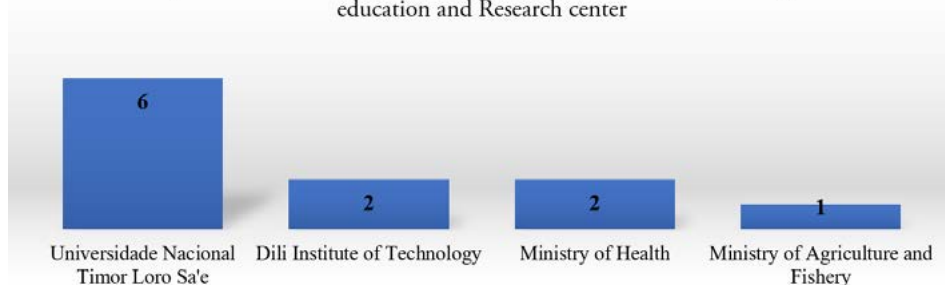
Graphic 10. Thematical area in 2023





Scientific research in 2023 was carried out by higher academic institutions, as shown in Graph 11. UNTL led the way with six studies, DIT with two studies, the Ministry of Health with another two studies and the Ministry of Agriculture and Fisheries with one scientific research study.

Graphic 11. Number of scientific investigation in 2023 based on higher education and Research center



The municipalities that hosted the INCT's scientific studies are shown in Graph 12. The capital had four studies, the municipality of Lautém had two studies, and the municipality of Manufahi had one study. Another three studies were carried out in various municipalities, such as the municipalities of Aileu, Ermera and Manatuto with one study. The municipalities of Aileu, Covalima and Dili had one study. The last study was carried out in the municipalities of Díli and Liquiçá.

Graphic 12. Number of research conducted in 2023 based location



e. Results of supervision and monitoring during the execution of the research in 2019, 2021, 2022 and 2023.

The National Institute of Science and Technology (INCT) has developed a practical guide for monitors to supervise and accompany scientific research in the field. In monitoring and supervision, the INCT team directly observes the execution of scientific research in the field. Several scientific investigations have been supervised and monitored (Libamba et al., 2006) in the fields of social sciences, natural and exact sciences, technology and innovation. Most of the scientific research was carried out in the capital and some of the country's municipalities.

Most of the scientific research was carried out based on a research calendar submitted annually by the researchers to the INCT and with the collaboration of local government leaders. To guarantee the implementation of scientific research, the INCT creates supervision and monitoring models for each scientific research based on the research proposal submitted to the INCT; for experimental research, it is necessary to create monitoring formats based on the content of the research methodology and the expected results.

All the municipalities were very welcoming to the researchers when it came to carrying out scientific research. Respondents or key informants were always willing to answer questions. Local government was also grateful to the INCT for continuing to allocate a research budget each year to give Timorese researchers the opportunity to work in municipalities beyond the capital. In addition, it was also suggested that the researchers continue to identify various potential resources in Timor-Leste.

Supervision and monitoring aim to directly follow the implementation of scientific research at a local level, such as the collection of samples, for example, interviewing stakeholders and other key informants in social science research. In the case of the exact and natural sciences, the emphasis is on experimental research. Scientific investigations are supervised and monitored, such as the laboratory diagnosis of imported frozen meat, the conversion of palm fruits into palm wine, the identification of the nutrient composition in grass for buffaloes and horses, sorghum plantations, the laboratory diagnosis of hypertension, the sensory testing of local biscuit



production and the transformation of coffee husks into nutritious feed for pigs, among others.

Preliminary and Final Results and Presentation at the Annual Celebration of World Science Day

The INCT has a guideline for the final report that is used by INCT researchers to draw up research results before making the annual preliminary presentation. In the preliminary results, the researcher has to present various data that have been collected, recorded, analysed and interpreted in front of external evaluators, representatives of line ministries, the public and students.

The preliminary presentation aims to prove and guarantee the implementation of scientific research in the field to the evaluators and the public. In addition, the evaluators can make contributions, suggestions and recommendations to improve the research teams' preliminary report.

In the final presentation, researchers must present the report based on the INCT guidelines for the final report. The final presentation aims to ensure that the report is well constructed, based on the rules of scientific research mentioned in the INCT guidelines for the final report. Of all the presenters of the preliminary presentation, some of the selected researchers gave the presentation at the annual celebration of World Science Day in front of members of the government, parliamentarians, civil society, academic representatives and guests.

Dissemination and Distribution of Research Results

The annual results of scientific research have been distributed by the INCT to relevant institutions at the national and municipal levels as references and for the formulation of public policies. In addition, the INCT has annually disseminated research results during the celebration of World Science Day to the public through scientific seminars. INCT researchers

have also disseminated scientific research results in various nationally and internationally recognised and accredited scientific journals, as shown in Table 5.

No.	Title of publication	Name of Online Journal	ISSN	Year of publication
1	Effect of using rice bran and tofu dregs fermented with moringa-based probiotics in the diet to improve the productive performance of male pig	International Journal of Animal Science and Technology	2640-1282	2022
2	Study of factors that influence the sustainability of agricultural development in the Bobonaro municipality, Timor-Leste	Agricultural science	2156-8561	2022
3	The Potential of Sorghum as a Staple Food Grown Using Fermented Organic Fertilizers and Different Plant Spacings in East Timor	Advances in Animal and Veterinary Sciences	2307-8316	2022
4	Design of flood discharge with synthetic unit hydrograph in Comoro watershed, Timor-Leste	Timor-Leste Journal of Engineering and Science	2789-228X	2023
5	Timor-Leste's coffee diversification: A case study of the hospitality industry in Dili, Timor-Leste	Timor-Leste Journal of Business and Management	2709-5355	2023

Table 7 - Some research results have been published in electronic journals.



Results of the Interview With Key Informants

INCT stakeholders argued that the existence of thematic areas, lines of research and research projects serve as a guideline for the public to apply for the research grants offered annually by the INCT. A scientific research guideline exists to make it easier for applicants to prepare research proposals that focus on various issues mentioned in Timor-Leste's National Strategic Plan 2011-2030 (PEN-TL) and the Sustainable Development Goals (SDGs). The selection process for the research proposals was transparent and in line with the existing INCT regulations. Most of the research proposals that passed the selection process involved science, technology and innovation. For example, the researchers transform rice bran and fermented tofu dregs with moringa-based probiotics into the diet to improve the productive performance of male pigs, among others.

INCT evaluators

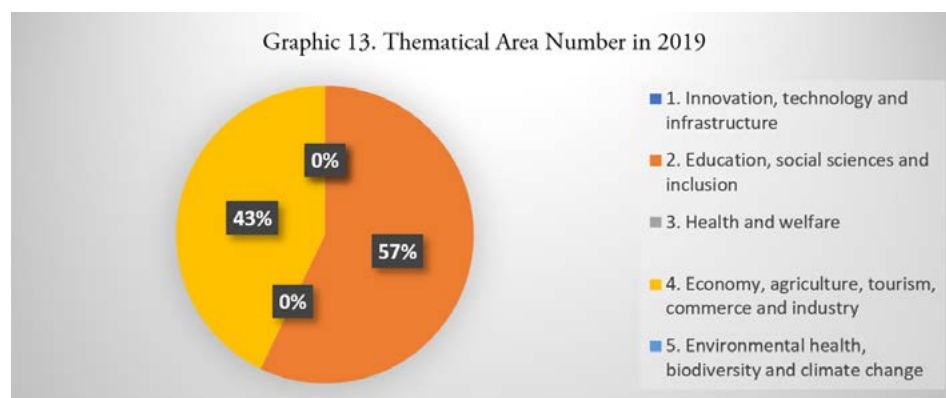
The INCT evaluators argued that most of the research funded by the INCT was good and reflected Timor-Leste's national strategic plan. As a newly independent country, the research initiation is a step in the right direction to start scientific study in the country. All the research followed scientific methodology and presented innovations. The lines of scientific research and studies are orientated according to the National Strategic Plan of East Timor 2011-2030. Likewise, the titles must be in line with the policy of the Ministry responsible during its mandate. Thus, the methodology and materials should be related to applied research.

The evaluation tool is good. However, some evaluators verbally stated that it is necessary to pay attention to the research methodology section and to broaden the distribution of marks because research methods determine the results of scientific studies to respond to the objective of the study. The evaluators also stated that funds are limited, so it is impossible to obtain good research results. On the other hand, in the field of agriculture, some evaluators said that some scientific research is too academic, which

is good for the academic community but not for farmers. Therefore, more international seminars or conferences need to be held in East Timor to increase interest in research and focus on research that will help farmers and stakeholders in the future.

Discussion

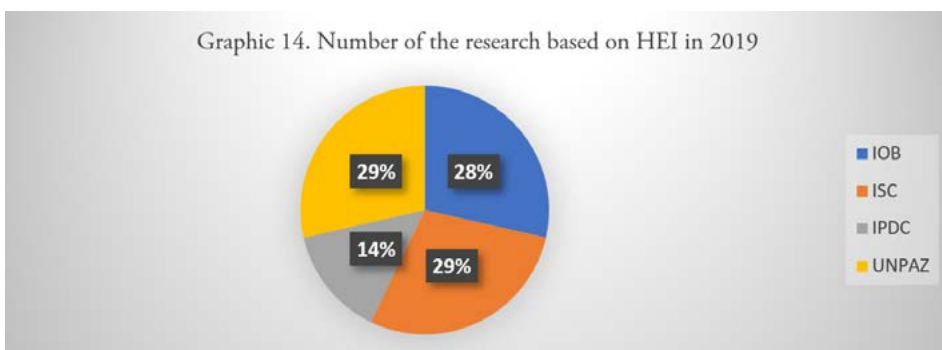
The 7 scientific research studies carried out in 2019 focussed on education, social sciences and inclusion, economics, agriculture, tourism, trade and industry. Of the 7 studies, 57% of them focused on the second thematic area and 43% of the studies focused on the third thematic area, as shown in graph 13.



The seven (7) 2019 surveys were carried out by various higher education institutions in Timor-Leste, such as IOB, ISC, UNPAZ and IPDC. ISC and UNPAZ, which got 29 per cent each. IOB came in with 28 per cent and IPDC with 14 per cent, as illustrated in graph 14.

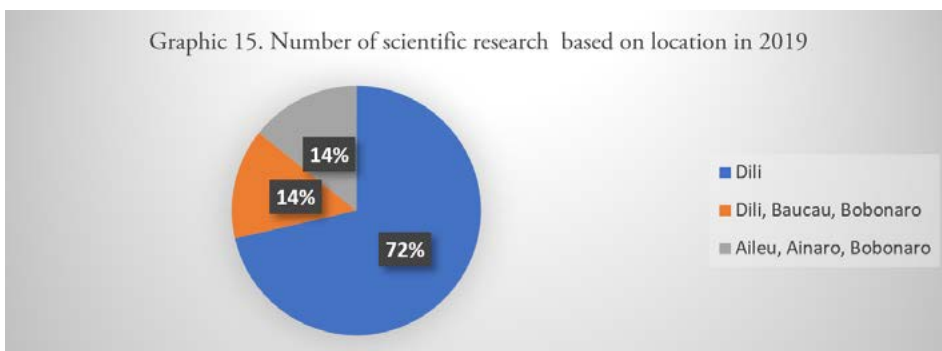


Graphic 14. Number of the research based on HEI in 2019



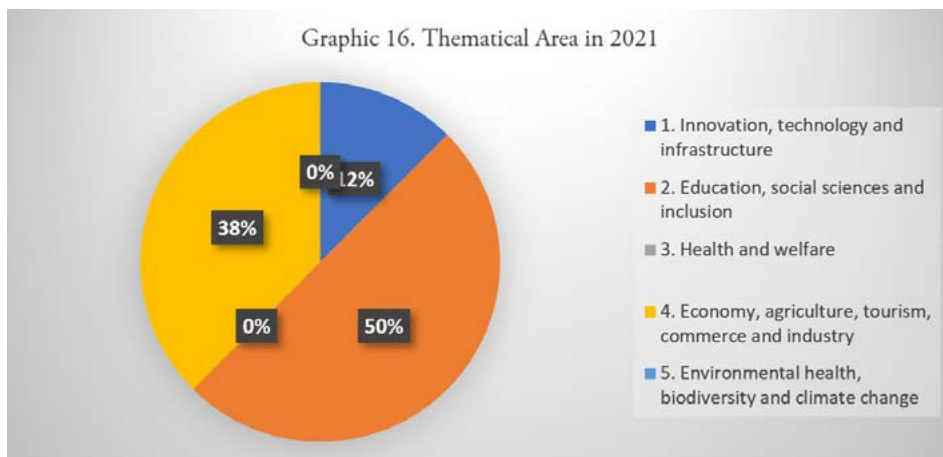
Of the 7 scientific investigations carried out in 2019, the municipalities that benefited from the implementation of the investigations were Aileu, Ainaro, Baucau, Bobonaro and Dili, as shown in Graph 15. The municipality of Dili benefited with 72%, three municipalities (Aileu, Ainaro, Bobonaro) hosted 1 investigation with 14%, and another three municipalities (Baucau, Bobonaro and Dili) hosted 1 scientific investigation with 14%.

Graphic 15. Number of scientific research based on location in 2019



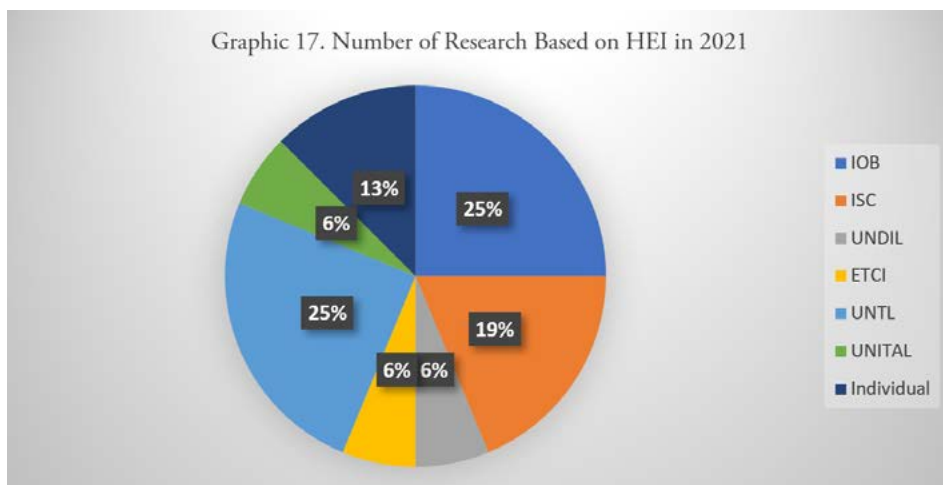
In 2021, 16 scientific studies were carried out based on thematic areas. The second thematic area, education, social sciences and inclusion, with 50 per cent, followed by the third thematic area, economy, agriculture, tourism, trade and industry, with 38 per cent; and innovation, technology and infrastructures, with 12 per cent, as shown in graph 16.

Graphic 16. Thematic Area in 2021



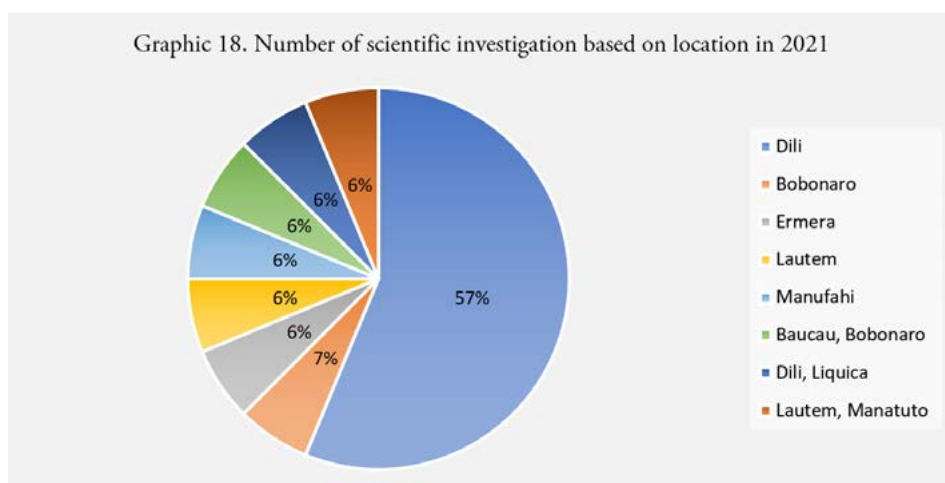
Of the 16 studies carried out in 2021 based on higher education institutions, IOB and UNTL had 25 per cent each, followed by ISC with 19 per cent, individuals with 13 per cent, UNDIL, ETCI and UNITAL had 6 per cent each, as shown in graph 17.

Graphic 17. Number of Research Based on HEI in 2021

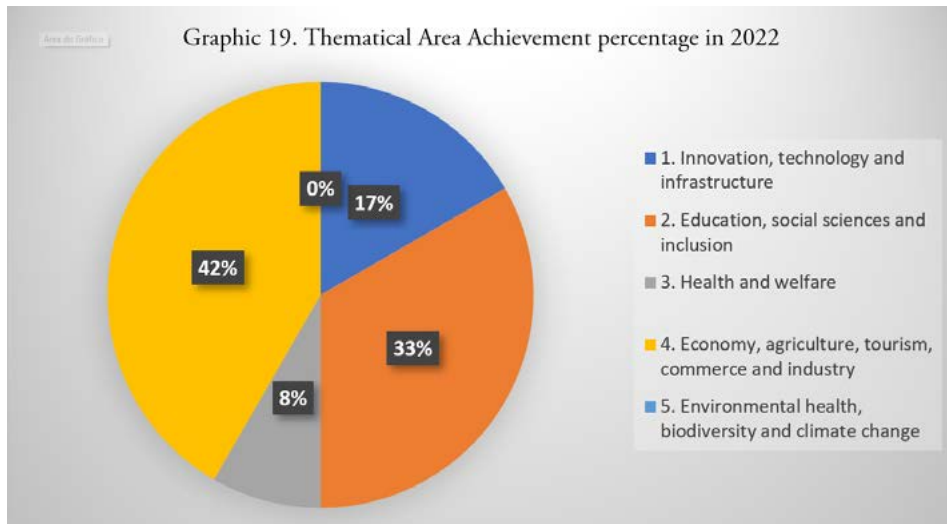




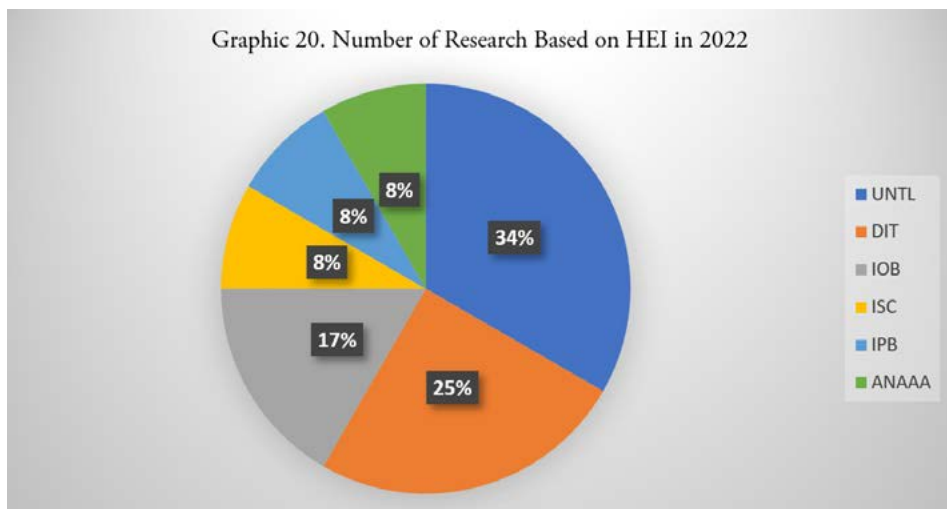
Graph 18 shows that the municipality of Dili concentrated 57% of the total scientific research in 2021, followed by the municipality of Bobonaro with 7%, and the municipalities of Ermera, Lautém and Manufahi with 6% each. Three scientific investigations were carried out in different municipalities (Baucau and Bobonaro, Díli and Liquiçá, Lautém and Manantuto), each with 6%.



In 2022, the majority of thematic areas were applied by researchers, such as the economy, agriculture, tourism, trade and industry, with 42 per cent. The thematic area of education, social sciences and inclusion with 33 per cent. The thematic area of innovation, technology and inclusion with 17% and the thematic area of health and well-being with 8%, as shown in Graph 19.

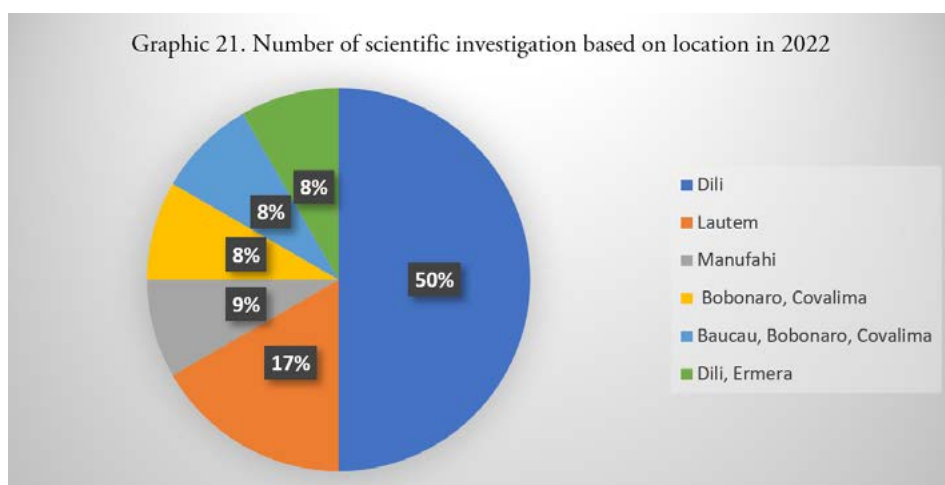


Of the 12 studies carried out in 2022, based on research by higher education institutions, UNTL obtained 34 per cent of the research. DIT with 25 per cent, IOB with 17 per cent, ISC, IPB and ANAAA each with 8 per cent, as shown in graph 20.

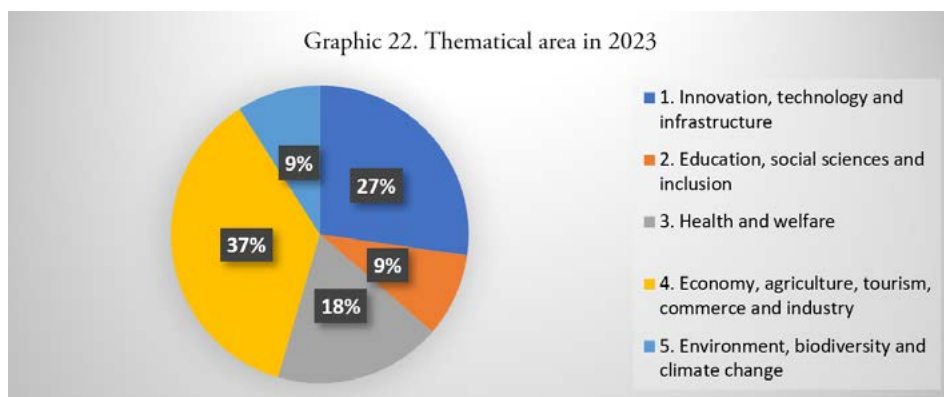




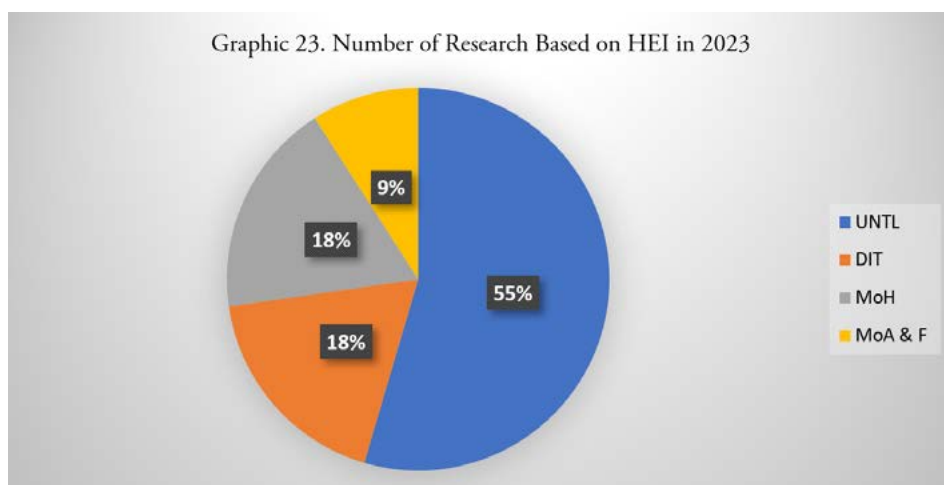
Graph 21 shows the distribution of the 12 scientific investigations by the municipality at a national level. The municipality of Dili was the site of 50 per cent of the research, the municipality of Lautém had 17 per cent of the research and the municipality of Manufahi had 9 per cent. However, three other scientific investigations were carried out in various municipalities (Bobonaro and Covalima, Dili and Ermera, and the last one in Baucau, Bobonaro and Covalima) each with 8%.



In 2023, eleven scientific studies were carried out based on the INCT's thematic areas. The economy, agriculture, tourism, trade and industry thematic area was the most popular, with 37 per cent. Three different thematic areas, such as education, social sciences and inclusion, innovation, technology and infrastructures and health and well-being, each had 18 per cent. The environment, biodiversity and climate change thematic area got 9 per cent.



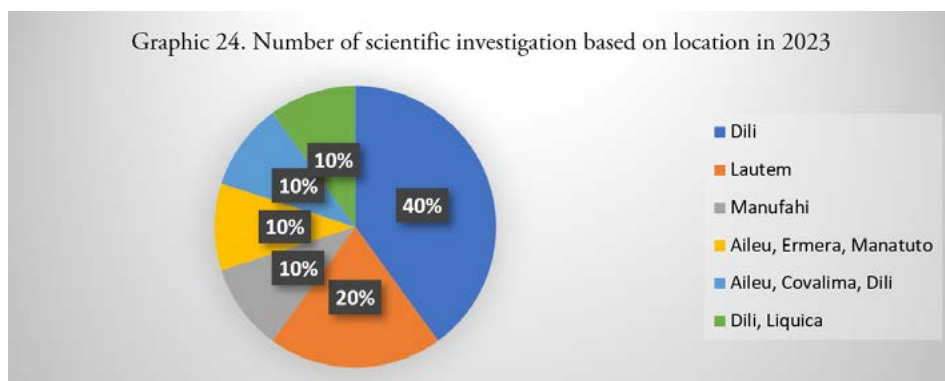
Graph 23 shows that in 2023, the UNTL higher education institution will have 55 per cent of the research, and DIT and the Ministry of Health (MoH) will have 18 per cent each. The Ministry of Agriculture and Fisheries (MoA & F) with 9 per cent.



Out of 11 scientific investigations in 2023, the municipality of Dili carried out 40% of the investigations, the municipality of Lautém 20% and the municipality of Manufahi 10%. Three scientific investigations were carried out in Aileu, Ermera and Manatuto, Aileu, Covalima and Dili, Liquiça and Dili, each with 10%, as shown in graph 24.



Graphic 24. Number of scientific investigation based on location in 2023



Conclusion

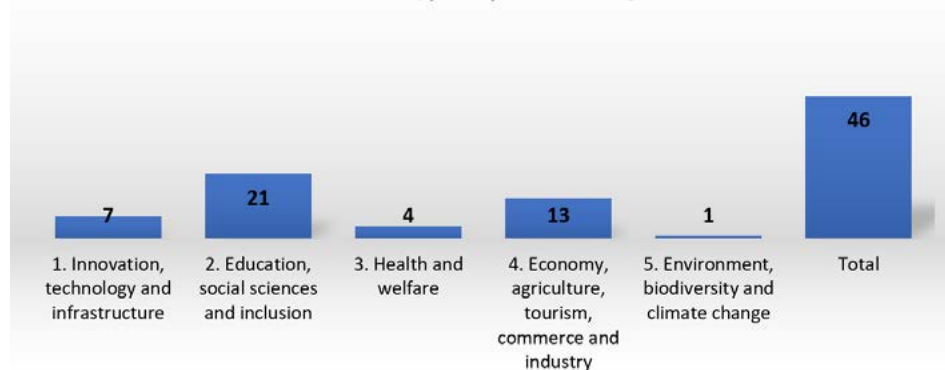
Out of five thematic areas, 46 scientific investigations were conducted and reported as shown in Table 6. 21 scientific studies were in the area of education, social sciences and inclusion; 13 investigations centred on the economy, agriculture, tourism, trade and industry; 7 scientific investigations were linked to innovation, technology and infrastructures; 4 studies were related to health and well-being; 1 investigation focused on the environment, biodiversity and climate change.

Thematical Areas	2019	2021	2022	2023	Total
1. Innovation, technology and infrastructure	0	2	2	3	7
2. Education, social sciences and inclusion	6	8	4	4	21
3. Health and welfare	1	0	1	2	4
4. Economy, agriculture, tourism, commerce and industry	0	6	5	2	13
5. Environment, biodiversity and climate change	0	0	0	1	1
Total	7	16	12	11	46
Grand Total	46				

Table 8 - Summary table of thematic area figures for 2019, 2021, 2022 and 2023

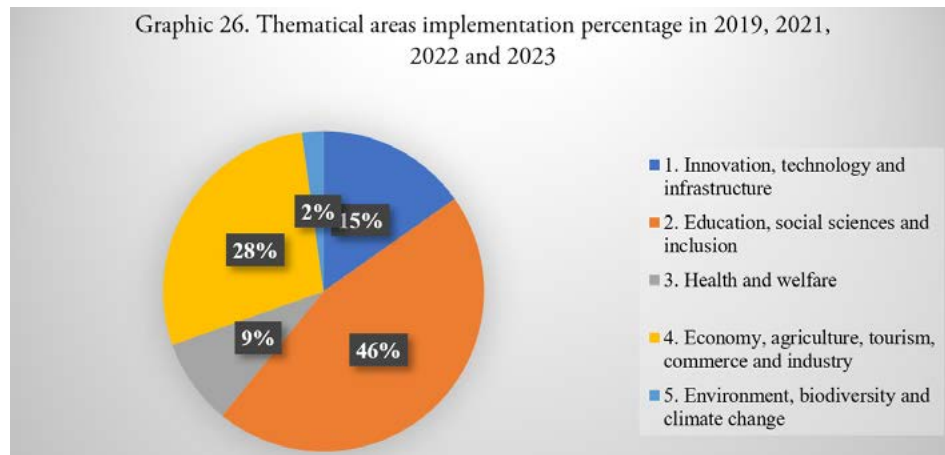
The 46 scientific investigations were carried out from 2019 to 2023. There were 7 studies carried out in 2019, 16 investigations were carried out in 2021, 12 investigations were concentrated in 2022 and 11 studies were focused on 2023.

Graphic 25. Number of thematical areas had been applied & implemented from 2019, 2021, 2022 & 2023



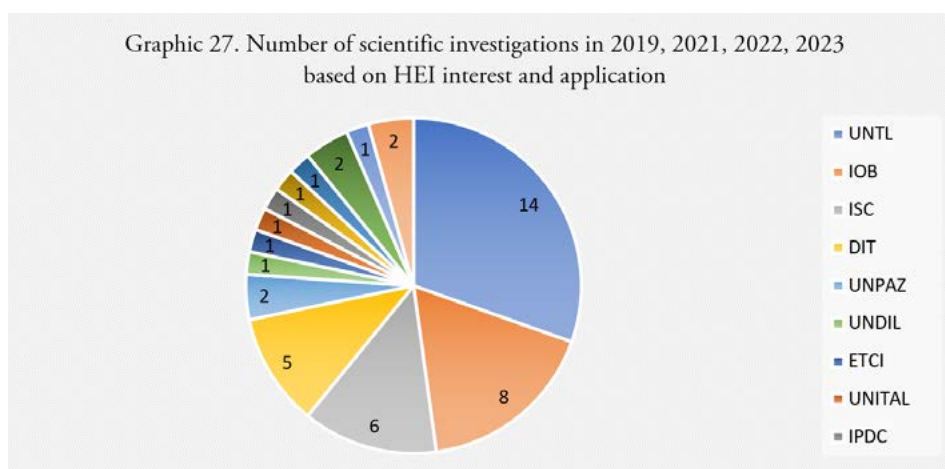
The highest percentage of scientific research was related to education, social sciences and inclusion, with 46 per cent, followed by the economy, agriculture, tourism, trade and industry, with 28 per cent. Innovation, technology and infrastructures with 15 per cent, health and well-being with 9 per cent and the environment, biodiversity and climate change with 2 per cent, as shown in graphic 26.

Graphic 26. Thematical areas implementation percentage in 2019, 2021, 2022 and 2023



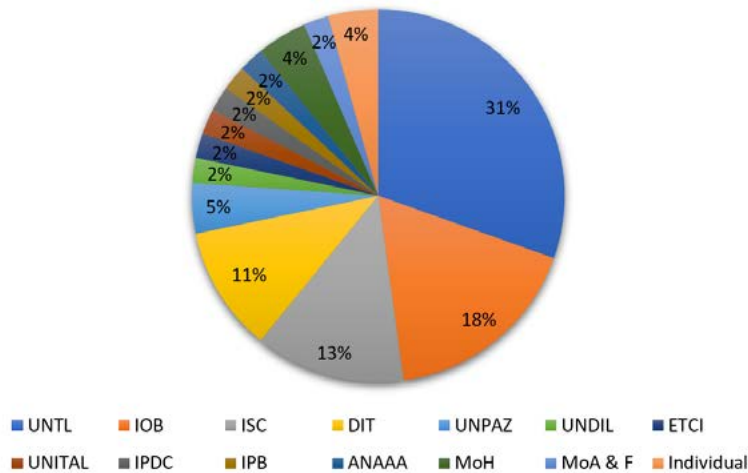


Of the 46 scientific investigations from 2019-2023, 14 studies were led by UNTL, 8 were conducted by IOB, 6 were done by ISC, 5 were carried out by DIT, 2 were implemented by UNPAZ, 2 were led by the ministry of health, plus 2 conducted by Independent Investigators. UNDIL, ETCI, UNITAL, IPDC, IPB, ANAAA, MoA & F, each of these institutions carried out 1 scientific study, as shown in graph 27.



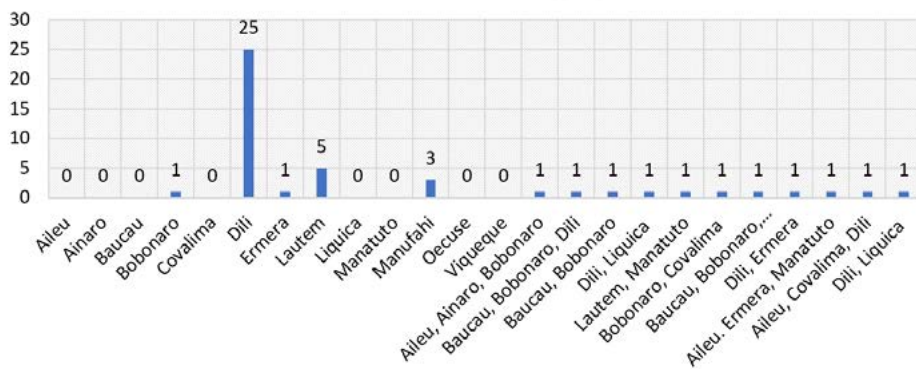
The graph summarises the scientific research carried out between 2019 and 2023 by higher education institutions. UNTL accounted for 31 per cent, followed by IOB with 18 per cent, ISC with 11 per cent, DIT with 5 per cent, MoH and independent researchers each with 4 per cent; UNPAZ, ETCI, UNDIL and other higher education institutions each had 2 per cent, as shown in graph 28.

Graphic 28. Summary of the number of Scientific Investigations in 2019, 2021, 2022, 2023 Based On HEIs Interest, Application and Implementation



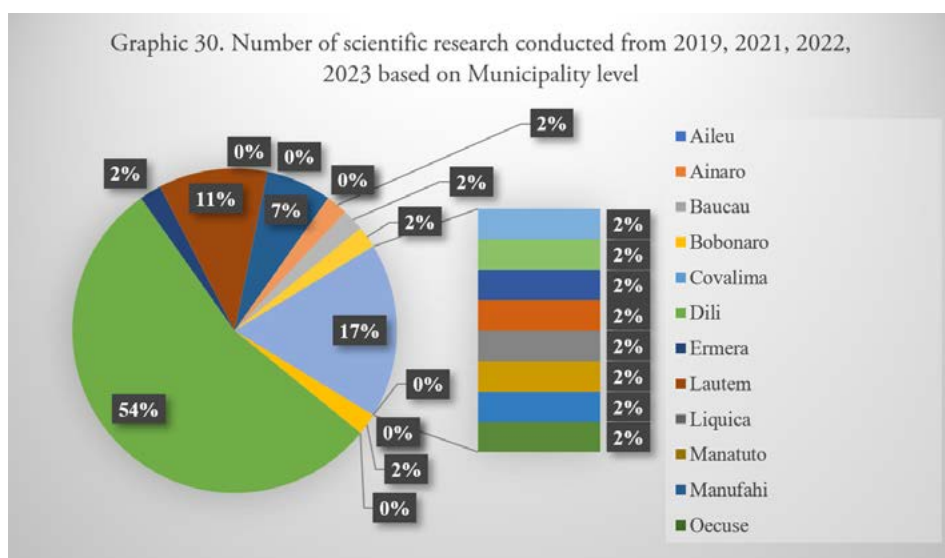
The municipalities that benefited from INCT scientific research between 2019 and 2023 were: Dili with 25 studies; the municipality of Lautém with 5 investigations; the municipality of Manufahi with 3 scientific studies. The municipalities of Bobonaro and Ermera each benefited from 1 study, as shown in Graph 29.

Graphic 29. Number Of Scientific Research Conducted From 2019, 2021, 2022, 2023 Based On Municipality Level





Of the 46 scientific research projects funded by the INCT between 2019-2023, the municipality of Dili benefited with 54 per cent, followed by two combined municipalities (Dili and Liquica) with 17 per cent, the municipality of Lautem with 11 per cent, the municipality of Manufahi with 7 per cent, each of the municipalities of Ermera, Bobonaro and Baucau with 2 per cent, as shown in graph 30.



Based on the table and graph presented, it can be concluded that for there to be more investment in science, technology and innovation, it is necessary to guarantee adequate funding to implement scientific research in East Timor in the future.

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