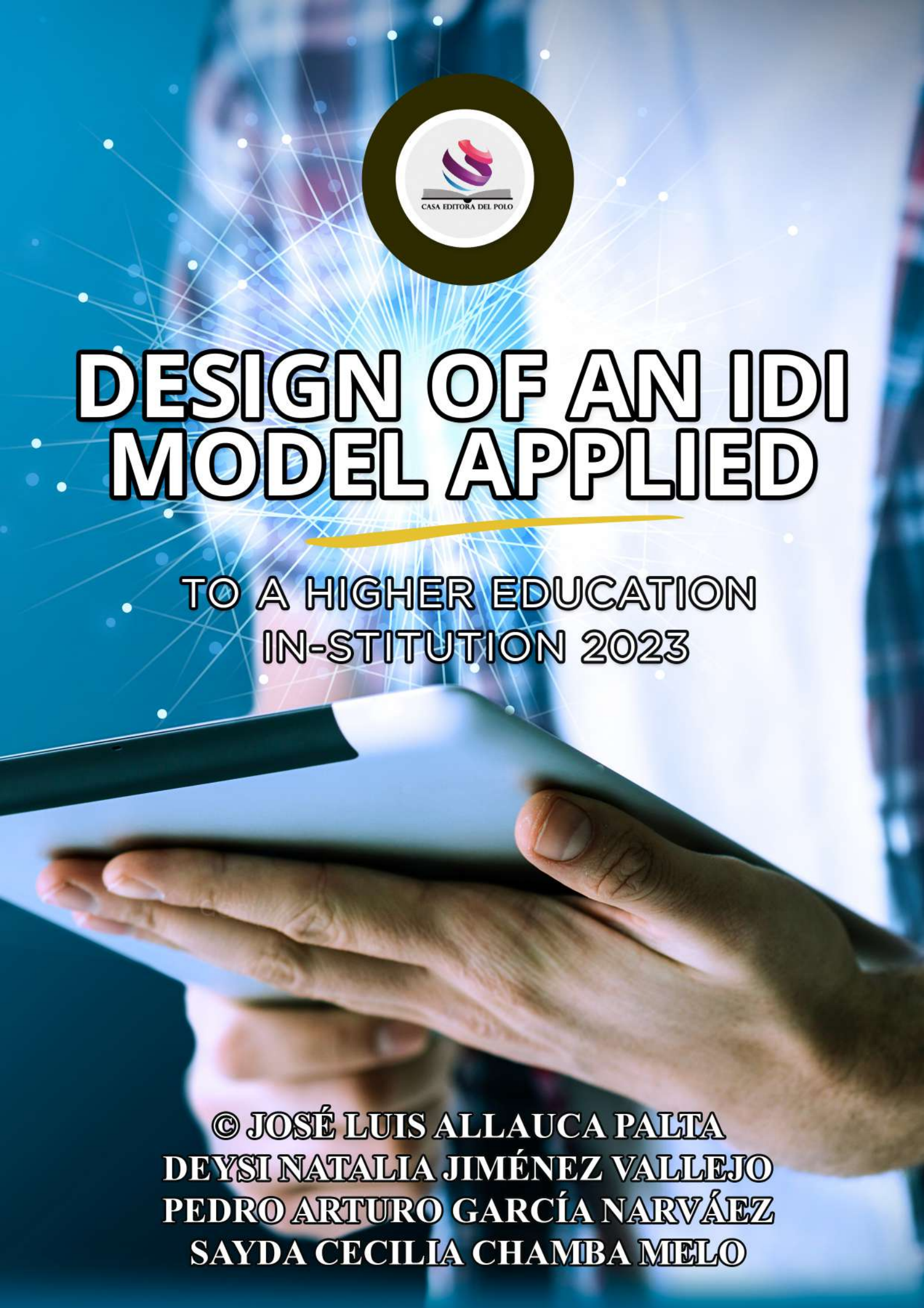
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DESIGN OF AN IDI MODEL APPLIED
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Design of an IDI Model Applied to a Higher Education In-stitution 2023

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Casa Editora del Polo - CASEDELPO CIA. LTDA.
Departamento de Edición

Editado y distribuido por:

Editorial: Casa Editora del Polo
Sello Editorial: 978-9942-816
Manta, Manabí, Ecuador. 2019
Teléfono: (05) 6051775 / 0991871420
Web: www.casedelpo.com
ISBN: 978-9942-621-27-6

Revisión, Ortografía y Redacción:
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Diseño de Portada:
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Diagramación:
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Contenido

PROLOGUE

As established by the current Organic Law of Higher Education in Ecuador in Article 176, the substantive functions of an educational institution include teaching, research, and engagement with society. Based on the Regulations for Technical and Technological Higher Education Institutions, Academic Reg-ulations, Regulations for the Career and Ranking of Professors and Researchers in Higher Education, Organic Code of Social Economy of Knowledge, Creativity and Innovation, Codified Statute, and IDI Regulations of ISTGEA, this work is presented, which contains the I&D and I&D&I model applied to ISTGEA.

The present Design of I&D&I Model applied to a Higher Education Institution 2023, is based on certain criteria such as the UNE 166002:2006 standard for I&D&I Management: Requirements for the I&D&I Management System and the external evaluation model 2024 developed by the Council for Quality Assurance in Higher Education (CACES), for the purpose of accrediting Technical and Tech-nological Higher Institutes in the country.

Finally, the I&D&I Model Design was approved by the ISTGEA Higher Collegiate Body for imple-mentation at the General Eloy Alfaro Technological Higher Institute, through RESOLUTION Nº017-OCS–MGI-2022-ISTGEA-29-09-2022-JS007.

DEDICATION

Dear readers,

It is an honor for the authors to present you with this research work, which is the result of effort, dedication, and passion for knowledge. Each page of this book represents a tireless search for new answers to old questions, and each conclusion represents one more step toward understanding our world.

I would like to thank those who have made this publication possible, institutions such as the Secretariat of Higher Education, Science, Technology and Innovation (SENESCYT), General Eloy Alfaro Techno-logical Institute (ISTGEA), Ab. Martha Bucarán de Roldós Intercultural Bilingual Pedagogical Superi-or Institute (ISPIB MBR) and the Polytechnic School of Chimborazo (ESPOCH), colleagues, family, and friends who have provided us with their support and guidance along the way, to the editors, reviewers, and collaborators who have made it possible for this book to reach your hands. Without their help, this project would not have been possible.

I hope these pages are as fascinating and enriching for you as they were for us during their development. This book not only represents a contribution to the field of research but also a call for reflection and con-stant questioning of our own beliefs and knowledge for the benefit of higher education.

Finally, we dedicate this book to all those who feel great enthusiasm for knowledge and exploration, and who continue to strive to unravel the mysteries of the universe. May this work inspire you to continue on your own search for truth and wisdom.

CHAPTER I

GENERALITIES

1.1 Description

This manual describes the general conditions in which the model of the I&D (research and technological development) or I&D&I (research, technological development, and innova-tion) management system of the General Eloy Alfaro Technological Higher Institute (ISTGEA) is framed.

1.2 Validity

The present model of the I&D (research and technological development) or I&D&I (re-search, technological development, and innovation) management system will come into effect from the date of approval resolution by the Superior Collegiate Body (OCS) of ISTGEA, and may be reformulated or terminated based on institutional growth and needs, at any time and approved by the same instance by the OCS of the General Eloy Alfaro Technological Higher Institute.

CHAPTER II

PURPOSE OF THE MANUAL

The purpose of the Manual is to guide the management of I&D or I&D&I by establishing policies, objectives, and strategies on which the ISTGEA research management model is based, in order to achieve the development of I&D or I&D&I activities and the obtaining of products framed within the external evaluation model of 2024, the ISTGEA institution-al strategic development plan (PEDI), and the national and internal regulations governing the technical and technological higher institutes in the country.

CHAPTER III

SCOPE

The I&D or I&D&I Management System of ISTGEA includes all the processes, mecha-nisms, and tools necessary for the achievement of its objectives such as obtaining I&D or I&D&I products, taking advantage of the results, and establishing commercial, social, and inter-institutional relationships within the local, national, and international context, based on the policy established for the management.

CHAPTER IV

DEFINITIONS

"The Basic Research comprises all those studies or original works that have as objective to acquire new scientific knowledge, it analyzes properties, structures, and relationships with the objective of formulating hypotheses, theories, and laws. In this stage, scientists carry out "discoveries"." (ISTGEA IDI, 2021)

Applied Research is based on the original work developed in basic research, but with the objective of acquiring new knowledge oriented towards a specific practical objective. The results of this research are susceptible to being patented for future commercial exploita-tion. In this stage, scientists or technicians "invent". (ISTGEA IDI, 2021)

Technological Development involves the use of knowledge acquired in applied research for the production of new materials, devices, procedures or services. In this stage, "know-how" has been acquired, and prototypes or pilot plants are developed.

Finally, if the prototype results are effective and viable, investments are made to produce on a large scale and sell to the market. When the market accepts the product or service, it becomes an "innovation". (ISTGEA R&D&I, 2021)

The IDI centers are structures dedicated to scientific and/or technical research, formed by the Research, Technological Development, and Innovation Groups. (ISTGEA IDI, 2021)

IDI groups are teams made up of academic staff, academic support staff (teaching, re-search and laboratory technicians, teaching and research assistants, technicians in the field of arts or teaching artists, research and project specialists, pre-professional interns, and undergraduate students starting research activities), and administrative personnel. They will be organized in a coordinated and permanent manner under the direction of academic staff to carry out research and outreach activities in a limited number of research and out-reach areas. The groups will be composed of personnel from the academic units of ISTGEA and institutional administrative staff as well as external personnel. (ISTGEA IDI, 2021)

Student IDI groups are research groups motivated by the curiosity to know or discover the unknown. They will be organized in a coordinated and permanent manner to carry out research and outreach activities in a limited number of research and outreach areas. The Student IDI Groups will be composed of ISTGEA students and external higher education students, under the guidance of a research professor or member of an ISTGEA IDI group, and following the guidelines of the IDI Coordination and the Academic Student Council. (ISTGEA IDI, 2021)

A Research, Technological Development and Innovation Project is a set of coordi-nated, interrelated and controlled activities aimed at meeting specific research, technologi-cal development and innovation

objectives that are clearly defined, with resources and a predetermined period of time. These projects may be co-financed by external organizations or funded by the Governing Body of Public Higher Education Policy and the Eloy Alfaro General Technological Institute. (ISTGEA IDI, 2021)

The results of IDI projects will be considered as scientific output, which comes from IDI projects, and their authors will be the academic and administrative personnel, as well as the students who are part of the project and belong to a center or IDI group. (ISTGEA IDI, 2021)

CHAPTER V

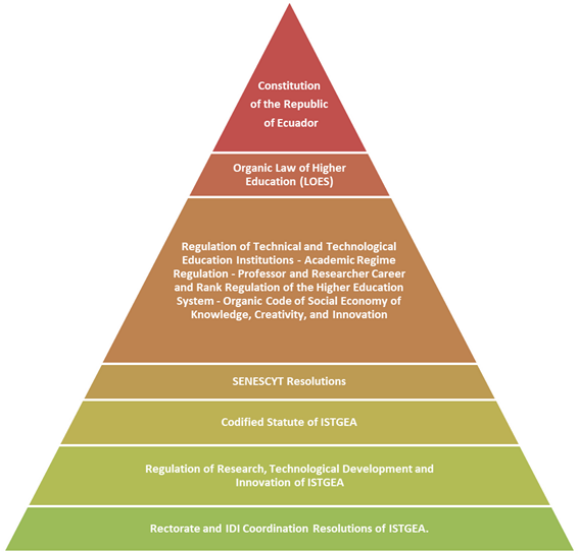
REFERENTIAL REGULATIONS

Next, the international guiding regulations are described, which are not mandatory for the Eloy Alfaro General Technological Institute, but have contributed to the construction of the ISTGEA research management model.

- The Colombian Technical Standard ICONTEC 5800-5801-5802
- UNE 166002:2006 Management of I&D&I: Requirements of the I&D&I Man-agement System

In relation to the regulations of application and obligation for the Eloy Alfaro General Technological Institute, it is, see illustration 1:

Illustration 1: Regulations applicable to IDI



Source: IDI Coordination

And the analysis of the 2024 external evaluation model for accreditation purposes for technical and technological higher education institutes in the country. (CACES, 2021)

CHAPTER VI

STRUCTURE OF THE IDI COORDINATION (IDI UNIT)

The Coordination of Research, Technological Development and Innovation will be com-posed of:

a) Coordinator of Research, Technological Development and Innovation;

b) Career Coordinators

c) Delegates from the Research, Technological Development and Innovation Centers of ISTGEA

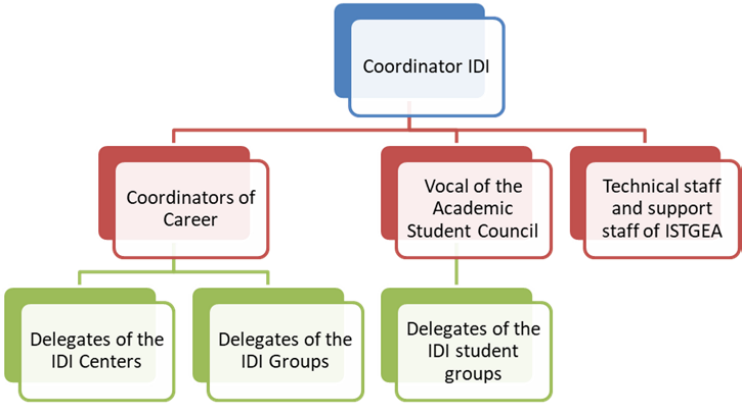
d) Delegates from the Research, Technological Development and Innovation Groups of ISTGEA;

e) Academic Student Council Representative;

f) Technical Staff; and,

g) Support Staff.

Illustration 2 IDI Coordination Structure (I&D&I Unit)



Source: IDI Coordination

CHAPTER VII

CONTEXT OF THE ORGANIZATION

7.1 Knowledge of the organization and its context

Through resolution Nº 13-OCS-RESO-29-06-2021-JS008, dated June 29, 2021, the Superior Collegiate Body resolved to issue the Statute of the General Eloy Alfaro Technological Higher Institute (codified), in accordance with literal w) of article 24 of the aforementioned Statute, it corresponds to the Rectorate to appoint the Coordinator of Research, Technological Development and Innovation, so through RESOLUTION Nº 007 RECTORADO-ISTGEA-11-2021, the IDI Coordinator was appointed. This was given and signed in the city of La Joya de los Sachas, on the twelfth day of November 2021, thus initiating the functioning of the Coordination of Research, Technological Development and Innovation.

The RESOLUTION Nº 14-OCS-RESO-29-06-2021-JS008 resolves to issue the Research, Technological Development, and Innovation Regulation of ISTGEA, with the aim of establishing the mandatory compliance rules that govern the Coordination of Research, Technological Development, and Innovation of the General Eloy Alfaro Higher Technological Institute.

The ISTGEA, when carrying out the research management model process, determines the relevant internal and external aspects that affect its ability to achieve the intended results. This analysis is included as part of the Institutional Development Strategic Plan (PEDI) of the ISTGEA, which is carried out every 4 years,

and the 2021-2025 Opportunities Creation Plan.

On the other hand, every year the Annual Operating Plan (POA) is prepared for the Coordination of Research, Technological Development and Innovation, which establishes:

- Strategic axis.
- Strategic objective.
- Product/Service.
- Activity.
- Timeframe (Start-End).
- Percentage of contribution of the activity to the product or service.
- Indicator.
- Target.
- Means of Verification.
- Month of execution of the activities.
- Coordination/Responsible Unit.

Every year, it is reviewed whether there are specific aspects that have changed significantly and that lead ISTGEA to consider any changes in the strategies proposed in the POA. This is for the fulfillment of the present model of the I&D or I&D&I management system

and the 2024 external evaluation model of the Council for the Assurance of the Quality of Higher Education (CACES), specifically the research, development, and innovation criteria, with the sub-criteria and evaluation indicators.

7.2 Understanding the needs and expectations of interested parties.

The IDI Coordination has identified the needs and expectations of relevant internal and external stakeholders, as established in Table 1, and is aware of the importance of ensuring adequate functioning and development, motivation and involvement of the research community at ISTGEA, knowledge of legal and regulatory requirements, and attention to technological changes and innovations required institutionally and by the market.

Additionally, the external analysis includes aspects of the market, technical, political, economic, and social factors, while the internal analysis includes operational aspects, capacities, financials, and resources.

Table 1 Stakeholders Research and Development (I&D) or Research, Development and Innovation (IDI) Management System

Clasificación	Grupos de interés de la I+D+i	Aspectos
Parte interesada interna	• Centro de IDI (personal académico) • Grupo de IDI (personal académico) • Docentes investigadores • Grupos de IDI estudiantiles (Semilleros) • Practicantes (Prácticas pre profesionales) • Practicantes (Prácticas de vinculación con la sociedad) • Tesistas (Trabajo de titulación integradora) • Personal técnico y personal de apoyo	• Operativos • Capacidades • Financieros • Recursos.
Parte interesada externa	• SENESCYT • CACES • CES • MINEDUC – Orellana. • MIES – Orellana. • GAD Provincial de Orellana. • GAD Cantón La Joya de Los Sachas. • GAD Parroquiales. • Empresas públicas y privadas de la localidad. • Instituciones de Educación Superior nacional o internacional. • ONG • Fundaciones nacional o internacional.	• Mercado • Técnicos. • Políticos • Económicos • Sociales

Source: IDI Coordination

7.3 The management system of I&D or I&D&I

The purpose of this research is to address the issues and needs identified in society or the market, through the collaboration of the triple helix model - version III, which includes the state, academia, and industry. (Espinoza,

2022)

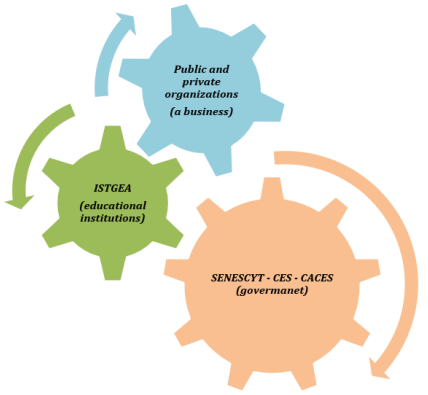
The triple helix is a key component in the strategy of research, technological development, and innovation at the national and international levels.

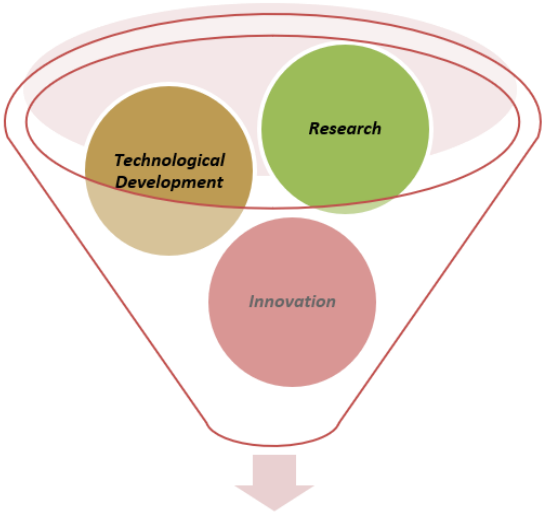
To ensure that collaboration contributes to the development of research, technological development, and innovation, partnerships and agreements must be established between ISTGEA, the productive sector, and the government.

Therefore, the relationship of the triple helix model contributes to the development of R&D or R&D&i capacity, to the extent that ISTGEA-SENESCYT has the ability to convert information and know-how into commercially viable products and services. (Barrios, 2020)

Illustration 3 provides a descriptive summary of ISTGEA's I&D or I&D&I management system.

Illustration 3 I&D or I&D&I Management System - ISTGEA





I+D o I+D+i

Source: IDI Coordination

CHAPTER VIII

LEADERSHIP

8.1 Mission, vision, principles, strategic objective, and I&D or I&D&I strategy

The model for the I+D or I+D+i management system proposes strategies in line with the mission, vision, principles, and strategic objective of ISTGEA, as described below:

Mission - We are a higher education institution that trains competent, innovative, and entrepreneurial technical-technological third-level professionals through excellent education that contributes to the cultural, social, economic, industrial, and productive development of the Ecuadorian Amazon and the country in a sustainable manner. (ISTGEA STATUTE, 2021)

Vision - To be a consolidated higher education institution in the training of competent, innovative, and entrepreneurial third-level technical-technological professionals through excellent education, forming leaders recognized at the local, regional, and national levels. (ISTGEA STATUTE, 2021)

Principles. - The principles that guide the institution, as outlined in the Constitution of the Republic and the Organic Law of Higher Education, are the following:

a) Co-governance;

b) Equal opportunities;

c) Quality;

d) Relevance;

e) Integrality;

f) Self-determination for the production of thought and knowledge;

g) Universality;

h) Equity;

i) Progressiveness;

j) Interculturality;

k) Solidarity;

l) Mobility;

m) Non-discrimination

These principles will be applied under criteria of quality, efficiency, effectiveness, transparency, responsibility, and participation. The mechanisms to implement them are developed in the articles that make up this Statute. (ISTGEA STATUTE, 2021)

Institutional Strategic Objective

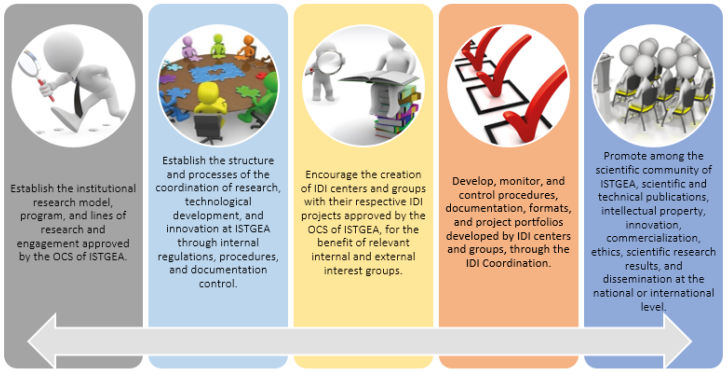
To strengthen the research processes and scientific development of the institution and the country by enhancing research through projects, publication of results, dissemination, and feedback of academic and scientific knowledge that effectively contributes to local, regional, and national development. (ISTGEA STATUTE,

2021)

I&D or I&D&I Strategies

The strategy of the General Eloy Alfaro Technological Higher Institute is based on the fulfillment of the following basic principles, see illustration 4:

Illustration 4: I&D or I&D&I Management Strategies - ISTGEA



Source: IDI Coordination

8.2 I&D or I&D&I Policy

ISTGEA, its authorities, administrative personnel, academic staff and students undertake the commitment to comply with the implicit and explicit requirements, as well as the legal and regulatory requirements applicable to the present research management model of the General Eloy Alfaro Technological Institute, reflected in the following commitments:

- Adequately identify the needs of ISTGEA to maintain constant knowledge of the current market and new technologies involved in the sector, which promote a quick response capacity to offer high-quality I+D or I+D+i products and services at all times.

- Encourage actions that help to manage I+D or I+D+i projects more effectively, favoring the use of current technologies.

- Maintain and increase the effort devoted to I+D or I+D+i.

- Promote a policy of protection and exploitation of the results obtained as a consequence of the ISTGEA's research management processes.

- Maintain a high level of I+D+i or I+D in the development and provision of its products and services obtained, within a permanent system of continuous improvement.

- Achieve the highest overall satisfaction of all those who make up ISTGEA, promoting their maximum commitment for the benefit of the institution, favoring a participatory environment among all those who make up ISTGEA, integrating into the common objective, and improving communications that facilitate teamwork, individual recognition, and suggestions for improvement.

- Manage resources that allow offering I+D or

I+D+i services in projects.

- Periodically review this policy for continuous adaptation. .

8.3 Leadership and Management Commitment

The leadership and commitment of the top management (Research, Technological Development and Innovation Coordination, representative and appointed by the Rectorate of ISTGEA), in accordance with the Codified Statute, Article 36, Research, Technological Development and Innovation Regulation, Article 6 of the General Eloy Alfaro Technological Institute, and the present research model, are evidenced through the following attributions and responsibilities:

A. Design and implement the research management model, within the framework of the provisions outlined in the Organic Law of Higher Education, the National Development Plan, the Strategic Plan of Institutional Development, as well as the domains of the institute that ensure the articulation of the substantive functions of higher education;

B. Direct the design and incorporation of research strategies (descriptive, exploratory, retrospective, prospective, diagnostic, and applied) as part of the theoretical-practical processes of each program and according to the domains of the Institute;

C. Advise the programs in the elaboration of research

plans and projects, according to the particularities of each program and its social environment, for presentation and approval by the Higher Collegiate Body;

D. Implement the evaluation, monitoring, and control system of strategies, activities, programs, projects, and plans, with methodologies, instruments, protocols, or operational research procedures;

E. Manage the implementation of the institutional entrepreneurship center, where ideas and plans for research, technological development, and innovation are promoted;

F. Promote continuous training programs oriented towards research, innovation, and technological transfer;

G. Manage agreements for the development of research programs and projects with institutions, social organizations, local and regional governments, and other entities that are part of the social economy of knowledge, popular and solidarity economy, creativity, and innovation, in articulation with the relevant areas, and ensure their compliance;

H. Propose mechanisms for the promotion of research, innovation, and technological transfer in social practice through the formation of research scenarios with social and productive sectors;

I. Promote the participation of the Institute in congresses, seminars, and conferences for the

presentation of research advances and results;

J. Promote the participation of teachers in academic committees or councils and editorial boards of institutional or high-impact scientific and/or academic journals;

K. Manage the participation of the Institute in research networks and programs;

L. Organize academic discussion groups for the presentation of research advances and results;

M. Form multidisciplinary teacher research teams based on academic domains and professional profiles;

N. Encourage the creation of student research groups, linked to promote research projects developed at the Institute;

O. Elaborate and monitor compliance with its Annual Operating Plan; and,

P. Other attributions delegated within the scope of its competencies.

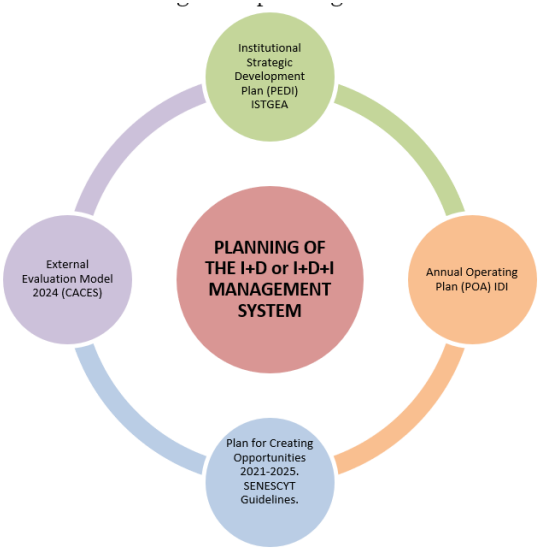
(ISTGEA IDI, 2021)

CHAPTER IX

PLANIFICACIÓN

After establishing the institutional strategic axes, the creation of I&D or I&D&I projects linked to the PEDI, POA, 2021-2025 Opportunity Creation Plan, guidelines of the Gov-erning Body of Public Policy (SENESCYT), the external evaluation model 2024 of the Higher Education Quality Assurance Council (CACES), the current research management model, and with the necessary resources allocated for their implementation, are planned, see illustration 5.

Illustration 5: I&D or I&D&I management planning - ISTGEA



Source: IDI Coordination

CHAPTER X

I&D&I SUPPORT

10.1 Organization of roles and responsibilities.

In addition to the powers and responsibilities of the IDI Coordination described in section 8.3 of this document, the Codified Statute, article 37, Regulation of Research, Technologi-cal Development and Innovation, article 7 of the General Eloy Alfaro Technological Insti-tute, and the present research model establish that the following will be products and ser-vices of the Research, Technological Development and Innovation Coordination:

1) Research management model;

2) Research strategies (descriptive, exploratory, retrospective, prospective, diagnostic, and applied);

3) Training and advice for the development of research plans and projects for the dis-ciplines;

4) Evaluation, monitoring, and control system for research strategies, activities, pro-grams, projects, and plans, using research methodologies, instruments, protocols, or operational procedures;

5) Implementation of the institutional entrepreneurship center;

6) Continuous training programs focused on research, innovation, and technological transfer;

7) Reports on viability and agreements for the development of research programs and projects with institutions, social organizations, local and regional

governments, and other entities that are part of the social economy of knowledge, popular and soli-darity economy;

8) Mechanisms for promoting and boosting research, innovation, and technological transfer;

9) Congresses, seminars, and conferences for the presentation of research advances and results;

10) Academic committees or editorial boards of scientific and academic journals with high scientific or academic impact;

11) Institute's participation in research networks and programs;

12) Academic discussion groups for presenting research advances and results;

13) Multidisciplinary research teams formed;

14) Institutional research projects;

15) Student research groups created;

16) Development and monitoring of the Annual Operating Plan.

(ISTGEA IDI, 2021)

10.2 Resources

The Governing Body of Public Policy and ISTGEA will work towards ensuring that fund-ing for scholarships (postgraduate, knowledge transfer), as well as funding for Research, Technological Development and Innovation projects, and publications in indexed journals, are included in the 6% of the total institutional budget, as stipulated in Article 36 of the Organic Law of Higher Education. Funding for the training and continuous improvement of teachers and researchers will be part of the institutional budget, as provided in Article 156 of the Organic Law of Higher Education.

10.3 Intellectual and Industrial Property and Knowledge Management

ISTGEA's Research, Technological Development and Innovation Regulation, in article 67 regarding the protection of intellectual property, states that "The benefits obtained from the exploitation or transfer of rights over inventions made as a result of research programs or projects will be jointly owned by ISTGEA and the participating researchers of each IDI Center or Group, in strict com-pliance with the provisions determined in the Organic Code of Social Economy of Knowledge, Creativity and Innovation. The National Service of Intellectual Rights is the technical public right agency, attached to the Secretariat of Higher Education, Science, Technology and Innovation, and competent national authori-ty that exercises the powers of regulation, management, and

control of intellectual rights."

10.4 Collaboration and Communication

Through the products and services offered by the Coordination of Research, Technologi-cal Development, and Innovation, described in item 10.1, collaboration and communica-tion are promoted among all those who are part of ISTGEA.

10.5 Technology Watch and Competitive Intelligence

The Higher Collegiate Body, as the highest authority of ISTGEA, and within its compe-tencies, approves the Regulations on Research, Technological Development, and Innova-tion, the present research model, program and research lines, and application links for ISTGEA, which aim at technological surveillance and competitive intelligence of the Gen-eral Eloy Alfaro Technological Higher Institute.

10.6 Documented information.

The development and coding of formats, templates, regulations models for IDI centers and groups, instructions for the preparation of IDI projects, management of the approved pro-ject portfolio for the application of the Research, Technological Development and Innova-tion Regulation, and the present research model of ISTGEA, will be the responsibility of the IDI Coordination of the Eloy Alfaro General Technological Institute.

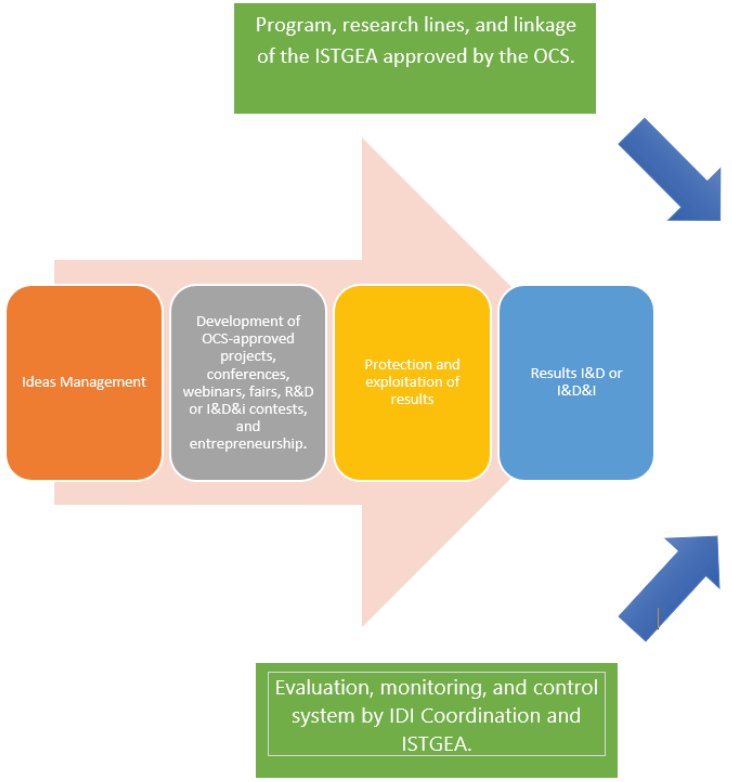
CHAPTER XI

PROCESSES OF I&D OR I&D&I OPERATIONS

11.1 Generalities

The I+D or I+D+i operational processes - ISTGEA are described in the following illustration:

Illustration 6 I&D or I&D&I operational processes - ISTGEA



Source: IDI Coordination

11.2 Programs, research lines and linkage of ISTGEA.

Institutional programs, research lines, and linkages are established, such that each career at ISTGEA will obligatorily select one or more (depending on the field of application) from the following table:

Tabla 2 Programas, líneas de investigación y vinculación del ISTGEA

LÍNEAS Y PROGRAMAS DE INVESTIGACIÓN Y VINCULACIÓN INSTITUCIONAL				
Nro.	**Línea de investigación**	**Programa Sublínea**	**Área Unesco**	**Plan-de-Creación-de-Oportunidades-2021-2025-Aprobado**
1	**Innovación en la Educación Superior a Nivel Técnico y Tecnológico.**	Gestión administrativa, académica e innovación en la educación superior.	**Educación**	Objetivo 7. Potenciar las capacidades de la ciudadanía y promover una educación innovadora, inclusiva y de calidad en todos los niveles.
2	**Desarrollo Infantil.**	Estrategias de estimulación práctico pedagógico para el aprendizaje infantil.	**Educación**	Objetivo 5. Proteger a las familias, garantizar sus derechos y servicios, erradicar la pobreza y promover la inclusión social.
		Planes y formación en políticas públicas, entornos protectores, derechos universales de convivencia infantil, familiar y social.		Objetivo 5. Proteger a las familias, garantizar sus derechos y servicios, erradicar la pobreza y promover la inclusión social.
		Aplicación de programas, metodológicas, técnicas o herramientas para la gestión e innovación en la educación prenatal y primera infancia.		Objetivo 7. Potenciar las capacidades de la ciudadanía y promover una educación innovadora, inclusiva y de calidad en todos los niveles
3	**Salud, Bienestar y Nutrición Infantil.**	Asesoría integral a la infancia y mujeres gestantes.	**Salud y servicios sociales**	Objetivo 16. Promover la integración regional, la inserción estratégica del país en el mundo y garantizar los derechos de las personas en situación de movilidad humana.
		Prevalencia o incidencia de la desnutrición infantil o en mujeres gestantes.		Objetivo 6. Garantizar el derecho a la salud integral, gratuita y de calidad
		Utilización de planes para la realización de actividades físicas, deporte o recreación infantil.		Objetivo 6. Garantizar el derecho a la salud integral, gratuita y de calidad
4	**Gestión de Servicios Técnicos y Tecnológicos.**	Seguridad industrial	**Servicios**	Objetivo 9.- Garantizar la seguridad ciudadana, orden público y gestión de riesgos
		Mantenimiento Industrial		Objetivo 3 Fomentar la productividad y competitividad en los sectores agrícola, industrial, acuícola y pesquero, bajo el enfoque de la economía circular.
5	**Creación, adaptación e innovación técnico y tecnológico aplicado a la industria y construcción.**	Soldadura y construcción estructural	**Ingeniería, Industria y Construcción**	Objetivo 3 Fomentar la productividad y competitividad en los sectores agrícola, industrial, acuícola y pesquero, bajo el enfoque de la economía circular.
		Procesos de Manufactura		Objetivo 3 Fomentar la productividad y competitividad en los sectores agrícola, industrial, acuícola y pesquero, bajo el enfoque de la economía circular.
		Tecnología de los Materiales		Objetivo 3 Fomentar la productividad y competitividad en los sectores agrícola, industrial, acuícola y pesquero, bajo el enfoque de la economía circular.
		Diseño y construcción de sistemas mecánicos, equipos y maquinaria industrial.		Objetivo 3 Fomentar la productividad y competitividad en los sectores agrícola, industrial, acuícola y pesquero, bajo el enfoque de la economía circular.

6	**Gestión, sostenibilidad y responsabilidad organizacional.**	Procesos de la gestión del Talento Humano	**Administración**	Objetivo 1: Incrementar y fomentar, de manera inclusiva, las oportunidades de empleo y las condiciones laborales.
		Gestión administrativa		Objetivo 3: Fomentar la productividad y competitividad en los sectores agrícola, industrial, acuícola y pesquero, bajo el enfoque de la economía circular.
		Gestión del Conocimiento y la Innovación		Objetivo 3: Fomentar la productividad y competitividad en los sectores agrícola, industrial, acuícola y pesquero, bajo el enfoque de la economía circular
		Mercadotecnia y publicidad		Objetivo 4: Garantizar la gestión de las finanzas públicas de manera sostenible y transparente. Objetivo 2. Impulsar un sistema económico con reglas claras que fomente el comercio exterior, turismo, atracción de inversiones y modernización del sistema financiero nacional
7	**Innovación o emprendimientos**	Emprendimiento, innovación e intra emprendimiento para empresas sostenibles en el tiempo.	**Administración**	Objetivo 1: Incrementar y fomentar, de manera inclusiva, las oportunidades de empleo y las condiciones laborales
8	**Tecnologías de la información y la comunicación (TIC)**	Aplicación de TIC en la administración, educación o industria	**Tecnologías de la información y la comunicación (TIC)**	Objetivo 2. Impulsar un sistema económico con reglas claras que fomente el comercio exterior, turismo, atracción de inversiones y modernización del sistema financiero nacional
9	**Desarrollo de competencias lingüísticas**	Enseñanza de las lenguas nativas o extranjeras	**Artes y Humanidades**	Objetivo 1: Incrementar y fomentar, de manera inclusiva, las oportunidades de empleo y las condiciones laborales. Objetivo 7: Potenciar las capacidades de la ciudadanía y promover una educación innovadora, inclusiva y de calidad en todos los niveles

Source: IDI Coordination

11.3 Idea management.

Las Coordinaciones de Carreras con el equipo docente gestionan, proponen e impulsan la creación de proyectos de I+D o I+D+i y la redacción de artículos científicos.

11.4 Development of OCS-approved projects

The IDI centers, groups, and student IDI groups carry out the research projects approved by the OCS, in accordance with internal regulations and guidelines from the IDI Coordination.

11.5 Protection and exploitation of results

All I+D or I+D+i publications, books, and presentations must have at least one of the following codifications: ISSN (International Standard Serial Number), ISBN (International Standard Book Number), URI (Uniform Resource Identifier), DOI (Digital Object Identifier), SICI (Serial Item and Contribution Identifier), or BICI (Book Item and Component Identifier) as appropriate.

ISTGEA researchers can make use of SENADI (National Service of Intellectual Rights), which is the competent body for protecting and defending intellectual rights; organizing and managing information on all types of property rights registrations in articulation with the National System of Information on Science, Technology, Innovation, and Ancestral Knowledge of Ecuador.

11.6 I+D or R&D+I Results

The IDI centers, IDI groups, and IDI student groups are responsible for disseminating the results of the research projects approved by OCS.

The IDI Coordination, together with the corresponding areas of ISTGEA, evaluates, registers, and archives the results of the R&D projects and other generated documentation and information, as evidence for each external evaluation process for accreditation purposes.

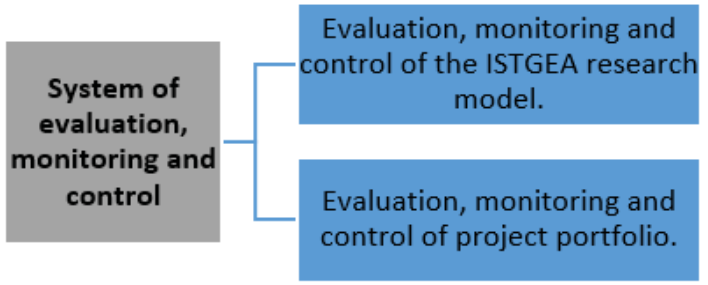
Scientific and technical indexed publications are considered results.

CHAPTER XII

EVALUATION, MONITORING, AND CONTROL SYSTEM

The evaluation, monitoring, and control system is part of the ISTGEA research model system, which seeks to evaluate activities, programs, projects, and research plans with methodologies, tools, protocols, or operational procedures that guarantee the execution of R&D or R&D+i, in accordance with the guidelines of the current model.

Illustration 7 Evaluation, monitoring, and control system.



Source: IDI Coordination

12.1 Evaluation, monitoring, and control of the IST-GEA research model.

For the evaluation of the performance of the I&D&I management system, the external evaluation model 2024 will be applied for accreditation purposes for technical and technological higher institutes, specifically the RESEARCH + DEVELOPMENT AND INNOVATION CRITERIA.

This evaluation will be carried out at most every two (2) consecutive PAOs, and if required institutionally, it will be evaluated every PAO or necessary PAOs that are subject to accreditation evaluation, with all members of the I&D&I Coordination, and the results will be presented to the authorities of ISTGEA for analysis and continuous improvement..

The evaluation, monitoring, and control sheets or matrices for the application of the ISTGEA research model will be the responsibility of the I&D&I Coordination of the General Technological Higher Institute Eloy Alfaro.

1) Subcriterion I&D and scientific and technical publications.

Aparecen en él los indicadores Investigación y desarrollo y Publicaciones científicas y técnicas. En el primero de ellos se integran la planificación y la ejecución de la actividad de I+D y en el segundo aparecen las publicaciones y las ponencias en eventos, cuyos objetivos sean la comunicación de los resultados científicos institucionales y el mejoramiento de las capacidades técnicas del talento humano de las entidades de producción y servicios. (CACES, 2021)

1.1) **Indicator of Research and Development**

Type of indicator: Qualitative.

Evaluation period: It corresponds to the two regular academic periods completed before the start of the

evaluation process. (CACES, 2021)

Standard:

The ISTGEA has, as part of its I&D plan, a strategic plan that consists of properly formulated lines, programs, and projects. This planning is mainly based on the need to find cognitive answers and technological solutions required for direct transformation of the environment through linkage with society and for the improvement of the development of substantive functions. The ISTGEA students participate in I&D activities directed by their professors, which constitutes a learning space for them. I&D projects are successfully executed, monitored, controlled, and evaluated, achieving their objectives. The intensity of the I&D activity is related to the number of professors available in the institution. The planning of I&D at all levels and the results of project execution are subject to discussion within the academic community. I&D activity is regulated within the institution and developed with high ethical standards. (CACES, 2021)

Description:

The indicators enrich the information available to the evaluation committee to assess compliance with the standard of the indicator.

a) Number of I&D projects executed or in progress, relative to the number of careers. The number of careers is an expression of the real

possibilities in organization and thematic options to develop I&D projects. By relativizing the projects to the number of careers, it expresses the extent to which the institute takes advantage of this potential. (CACES, 2021)

$$PIDC = \frac{NPID}{NCV}$$

Where:

PIDC: I&D projects per career..

NPID: Number of I&D projects executed or in progress that meet the requirements indicated in the *Description*.

NCV: Number of current careers with enrolled students.

b) Number of I&D projects executed or in progress relative to the number of full-time equivalent professors. The number of full-time equivalent professors is an expression of the potential in human resources of the institution for the execution of I&D projects. By normalizing the projects to the number of professors, it expresses the extent to which the institute makes use of that potential. (CACES, 2021)

$$PIDPE = \frac{NPID}{NTC + 0{,}5 * NMT + 0.25 * NTP}$$

Where:

PIDPE: I&D projects per 100 equivalent full-time professors.

NPID: Number of I&D projects executed or in execution that meet the requirements indicated in the *Description*.

NTC: Number of full-time equivalent professors.

NMT: Number of part-time professors.

Fundamental Elements

1. There is an internal I&D regulation, approved and in force, framed within national regulations, which defines, at least, the institutional structure that attends to the activity, the procedures, the role of the different actors, and the code of ethics for I&D activity. If the institution is managed by processes, the manual developed to regulate them, if it complies with the requirements of this type of document and includes the scope of this indicator, is equivalent to the regulation requested here.

2. There is a well-developed methodological planning for R&D activity, integrated into the

PEDI and consistent with the rest of the strategic planning. The operational planning for R&D is part of the POA and is appropriately articulated with the strategic planning. R&D planning consists of the lines, programs included in them, as well as R&D projects, executed or in progress, both those that are part of the programs and other independent projects that meet the requirements indicated in the Indicator *Description*.

3. The content of I&D planning is mainly supported by a diagnosis of the needs to find the cognitive responses and technological solutions required for the direct transformation action of reality through the linkage that the institution performs or plans to perform, and the need, also, to find cognitive responses and procedures in order to improve the development of substantive functions, especially student training. Corresponding to social demands and cultural interests, and with its possibilities, the institute may also include in its I&D planning studies on social, historical, and cultural problems in general, or on nature, related mainly to its environment.

4. The I&D planning proposals have been analyzed in the academic community of the institution since their first definitions, and the professors have been able to contribute with their proposals.

5. The executed or in-progress projects, except for properly justified exceptions, are part of the lines and programs, or are independent projects, in the approved I&D planning.

6. Those responsible for the I&D lines, programs, and projects can explain and support the planning and explain how the execution is going, in the cases that correspond to them.

7. The documents of the I&D projects are correctly formulated and have as basic components those indicated in the Indicator Description..

8. The I&D projects are executed, except for adequately justified cases, according to what is established in their own plan. Execution is subject to monitoring, control, and evaluation by the institution, and their objectives have been met or are in the process of being met.

9. The institution's evaluation of I&D projects focuses on the fulfillment of their objectives.

10. The intensity of action in I&D corresponds to the organization's capabilities, thematic options, and number of professors, expressed by the relationship between the number, relevance, magnitude, and complexity of the executed or in-progress projects, with the number of equivalent full-time careers and professors. To these effects,

the result of calculating the two quantitative support indicators included in the *Description* will be taken into account.

11. The results of the executed research or development projects, including their results and discussion, appear in one or more output documents (official institutional reports, technical and scientific publications generated from the project results, papers presented at scientific or technical events or academic theses).

12. The project documents and subsequently their results have been analyzed in the institute's academic community or the career's academic community. The final output documents have been uploaded to the institutional website and entered into the library's collection as part of the institution's absorption system.

13. Unless justified otherwise, students must participate in R&D projects. Each student has a learning plan within the project, which is monitored, controlled, and evaluated. Students can explain how the project is conceived and programmed, how its execution is progressing, and how they are progressing in their learning plan. (CACES, 2021)

Evidence

1. Internal regulations on R&D (captured through the SIIES application).

2. Institutional Strategic Development Plan (PEDI) and complementary documents generated by the institute on R&D planning (captured through the SIIES application).

3. Annual operational plans (captured through the SIIES application)

4. Documents of R&D projects executed or in progress during the evaluation period (captured through the SIIES application).

5. Evidence of analysis in the academic community of the institute of proposals for R&D planning (lines and programs) (meeting minutes, testimonials, explicit audiovisual material, etc.). Audio and video recordings must comply with Article 178 of the COIP (captured through the SIIES application) (visita in situ)

6. Evidence of monitoring, control and evaluation of the execution of R&D projects and the participation of students in them (minutes, reports, testimonials, etc.) (captured through the SIIES application) (visita in situ).

7. Evidence of analysis in the academic community of the institute or the program of R&D projects and the results of their execution

(captured through the SIIES application).

8. Learning plans of the students participating in I&D projects with their evaluation (visita in situ).

9. Interviews with students participating in I&D projects (visita in situ).

10. Interviews with responsible persons for I&D lines, programs, and projects (visita in situ).

11. Output documents (official institutional reports, technical and scientific publications generated from the results of the work, papers presented at scientific events or academic theses) of the executed R&D projects (captured through the SIIES application).

12. Institutional website (visita in situ).

13. Visit to the library (visita in situ). (CACES, 2021)

1.2) **Indicator of scientific and technical publications and events.**

Type of indicator: Quantitative.

Evaluation period: Corresponds to the last six ordinary academic periods concluded before the start of the evaluation process.

Calculation method

$$PCT = \frac{4 * NLCT + 2 * NAC + 1 * NEF}{NTC + 0{,}5 * NMT + 0.25 * NTP}$$

Where

PCT: Scientific and technical publications.

NLCT: Number of scientific and technical books published.

NAC: Number of articles published in scientific or technical journals and chapters of scientific and technical books.

NEF: Papers presented at scientific or technical events and published in the proceedings of the event and technical brochures.

NTC: Number of full-time professors (TC) during the standard evaluation period..

NMT: Number of part-time professors (MT) during the standard evaluation period.

NTP: Número de profesores TP en el período estándar de evaluación.

Note: The calculation of the denominator generates the number of full-time equivalent professors (TC) during the standard evaluation period. (CACES, 2021)

Standard

The institute obtains at least a value of 0.5 in this indicator.

Description

The indicator evaluates the efforts and results of the institution to generate scientific and technical publications, based on its R&D results or relevant technical studies, whose content and writing meet the requirements in higher education. The scientific and technical publications are weighted according to their complexity and volume. (CACES, 2021)

Evidence.

1. Documents of publications and events (captured through the SI-IES application).

i. **Books, book chapters, and technical brochures.** Present the digital version in PDF format of the publication already editorialized according to the requirements indicated in the Description. For publications that also had, or only had, a digital publication uploaded to the institutional website, also indicate the link where it can be located. If digital versions are not available, scan the printed version and upload it. In the case of documents without a digital version and that have a

high number of pages (more than 30), the printed document must be presented *in situ*, always in an editorialized version. (CACES, 2021)

ii. **Articles published in journals.** Present the digital version in PDF format of the publication already editorialized. If the above is not available, scan the published version on paper and upload it to the application as an image. Scanned pages of credits and the index of the edition of the journal containing the presented article. For articles that will be published after the evaluation period has ended, present the digital version in PDF format of the publication, the acceptance communication to publish from the journal with a date within the evaluation period, and scanned pages of credits and the index of a recent edition of the journal.

iii. **Papers presented at scientific and technical events.** Full text of the paper in digital format. Full proceedings of the event in PDF format. In cases where a digital version of the event proceedings is not available, the printed document must be presented in situ, always in

an editorialized version. Certificate of participation in the event indicating the name of the event, title of the paper, author, and date of the event. For events that took place after the evaluation period has ended, the communication from the organizing committee with the acceptance of the paper must also be presented, with a date within the evaluation period, regardless of the presentation mode assigned to it.

2. Documents related to the review of the publication in cases where these are required, as indicated in the Description (captured through the SIIES application).

3. Institutional certification for each publication indicating the approximate date interval (at least month and year) in which the publication was produced (captured through the SIIES application).

4. Institutional certification for each article authored by a professor at the institute and published in the institution's journal, indicating that it has been peer-reviewed (captured through the SIIES application).

5. Contracts of professors who belonged to the institution during the standard evaluation

period and contracts of professors who are authors of scientific and technical publications but no longer work at the institution, to prove that the professor was hired at the institute when the work was produced (captured through the SIIES application).

6. Documents that support institutional support in the case of publications in which the affiliation of the publication to the institute is not evident in the credits. These supports can be explicit invoices, in the name of the institution, referring to payment for authorship, editing, printing, etc., or certification, with the usual attributes of authenticity, signed by the ISTT authority and the author(s) of the publication, which declares the period in which the publication was generated and describes the concrete support provided by the institution to it (captured through the SIIES application). (CACES, 2021)

2) Subcriterion Innovation.

Its only indicator, Innovation and absorptive capacity, evaluates for the first time, and transversally, the main basis of scientific and technical progress: the introduction of innovation. (CACES, 2021)

1.1) **Innovation and Absorption Capacity Indicator**

Type of indicator: Qualitative

Evaluation period: It corresponds to the two ordinary academic periods concluded before the start of the evaluation process.

Standard

The institute is an entity that systematically innovates in the execution of its three substantive functions and in its production or service provision areas, if applicable.

Additionally, it is an agent that drives innovation in the beneficiary entities of its linkage projects and in its general environment. The innovative potential of the institution has as an important basis the existence and operation of a system to identify, acquire, assimilate, transform, and exploit external knowledge, as well as that generated internally. The existence and operation of the system are regulated. (CACES, 2021)

Description

The Organic Law of Higher Education calls on IES to work towards "(…) Contributing […] to the development of scientific production, […] and to the promotion of technological transfers and innovations" and "Promoting the generation of programs, projects, and mechanisms to strengthen scientific and technological innovation, production, and transfer in all areas of knowledge"" (LOES, 2018, Art. 8).

Fundamental Elements

1) There is an approved and current internal regulation, framed within national norms, that regulates the innovation and absorption capacity system, which is applied to institutional actions aimed at identifying, acquiring, assimilating, transforming and exploiting new knowledge, whether external or internal, that contribute to the cognitive updating of the student training process, or to the introduction of innovations in the areas indicated in the Description. The regulation establishes, at least, the objectives, procedures, responsible parties and participants in the processes, taking into account the content of the Description. In case the institution is managed by processes, the manual developed to regulate them, if it meets the requirements of this type of document and includes the scope of this indicator, is equivalent to the regulation required here.

2) The institute is a systematically innovative entity, which is expressed in the introduction of innovations in the execution of its substantive functions, especially in student training, and in the productive processes and provision of services carried out by the institution, if applicable. The introduction of an innovation in the institution must start from a project prepared for this purpose, as indicated in the Description. The quantity of innovations introduced in the institute

and their relevance and novelty, as well as the rigor with which they have been introduced and evaluated, are taken into account.

3) The institute is an agent of innovative activity in its environment through the introduction of innovations in the productive activity and provision of services carried out by the beneficiary entities of its linkage projects, and through the technological dissemination it carries out in the environment. The quantity of innovations introduced in the beneficiary entities of the linkage projects and their relevance and novelty, as well as the rigor with which they have been introduced and evaluated, are taken into account.

4) The innovation and absorption capacity system operates adequately in the institution, which enables the efficient identification, acquisition, assimilation, transformation and exploitation of new knowledge, as indicated in the *Description*.

5) The main actors in the innovation and absorption processes can explain, regarding the actions taken, their content, justification, procedures used, results obtained and aspects that need improvement. (CACES, 2021)

Evidence

1. Approved and current internal regulations on the innovation system and capacity for absorption (captured through the SIIES application).

2. Evidence of the introduction of innovations in the institute's activity (academic body agreements, projects for the introduction of innovations, studies that demonstrate the results obtained, direct observation of processes if possible, etc.) (captured through the SIIES application and visita *in situ*).

3. Evidence of the institute's activity as an agent of innovative activity in the environment (execution or ongoing execution of outreach projects that explicitly state the introduction of innovations in beneficiary entities, direct observation of processes if possible, outreach activities in the environment on new technologies, etc.) (captured through the SIIES application and visita *in situ*).

4. Evidence of the functioning of the innovation and absorption capacity system, which includes the five actions indicated in the *Description* (record of each process for absorbing new knowledge, academic and technical documents related to it, records of the capture of ethnoknowledge or traditional knowledge, library outreach actions in this regard, records of the

multiplication event, documents demonstrating the introduction of new knowledge into the teaching process, etc.) (captured through the SIIES application and y visita *in situ*).

5. Interviews with actors in the innovation and absorption capacity system (visita *in situ*). (CACES, 2021)

12.2 Evaluation, monitoring, and control of project portfolio.

The evaluation, monitoring and control of the project portfolio for IDI centers and groups, student IDI groups, with the respective formats will be in accordance with the Research, Technological Development and Innovation Regulations of ISTGEA, this ISTGEA research model and the competence of the IDI Coordination of the General Eloy Alfaro Higher Technological Institute, as well as the formats for the learning plan of the students participating in I&D or I&D&I projects, with the respective evaluation as appropriate.

12.3 Internal Audit.

The I&D or I&D&I management system will be internally audited in accordance with section 12 of the current document.

12.4 Management Review.

This review will be carried out at least every two (2) consecutive PAOs. If institutionally required, it will be

evaluated every PAO or necessary PAOs for accreditation purposes, with Rectorate and IDI Coordination for analysis and continuous improvement.

CHAPTER XIII

IMPROVEMENT OF THE I&D&I MANAGEMENT SYSTEM

The Rectorate and the I&D&I Coordination will analyze data and information related to the functioning of the I&D&I management process, the results obtained in the evaluation, monitoring and control of the research model, and finally the evaluation, monitoring and control of the project portfolio.

The data that will normally be analyzed are:

- Perception of stakeholders.
- Progress of processes and results of process indicators.
- Status of defined improvement and preventive actions.
- Status of non-conformities and corrective actions.

The results obtained in this analysis will serve to establish new continuous improvement actions, the systematic approach and responsibilities for their implementation, and all this will be documented.

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ISBN: 978-9942-621-27-6