INSTITUTIONAL EVALUATION REPORT

Costa Rica Institute of Technology - TEC

SEPTEMBER 2017

The Costa Rica Institute of Technology (TEC) has mandated the Hcéres to perform its institutional evaluation. The evaluation is based on the "External Evaluation Standards" of foreign Higher Education and Research Institutions, adopted by the Hcéres Board on October 4th, 2016. These standards are available on the Hcéres website (hceres.fr).

For the Hcéres[1] :

Michel Cosnard, President

On behalf of the experts committee[2] :

Bruno Delvaux, President of the committee

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I. PRESENTATION OF THE INSTITUTION

Context

Costa Rica is facing major socio-economic challenges[1] a.o.: moving from a rural to a diversified and integrated economy involving added value through innovation, reaching the social achievement, ageing populations. Government policies are currently undertaken to reach growth and stability within a sustainable development framework. However, energy cost, and a deficient infrastructure for transport and logistics may compromise the competitiveness of Costa Rica. The government has embarked on macroeconomic reforms to reduce the productivity gap with regional competitors, and meet innovation challenges related to natural resources, biodiversity, and technology and biotechnology issues.

Supply of skills

At the regional level, the location of Costa Rica promotes its regional integration with Northern and Central America. The diversification of exports towards Europe and Asia is growing. Yet unsatisfied demand for relevant skills is an obstacle to innovation and competitiveness. Graduates in science, technology and engineering represent, on average in OECD countries, 25% of all graduates. Emerging countries such as China and India exhibit larger rates (35%). The Inter-American and Ibero-American Network of Science and Technology Indicators (*Red de Indicadores de Ciencia y Tecnologia*, RICyT) points that Costa Rican universities' graduates in engineering and technology are proportionally low: 6% against 15% in the LAC area[2]. However, including the *Engineering and Technology* category accounts for an average of 11.4% of the total diplomas awarded in 2010-2015, which brings the country closer to the average in LAC. Besides, the number of Costa Rican PhD graduates is proportionally low. According to the report *Estado de la Ciencia, Tecnologia y Innovacion*, only 18% of researchers hold a PhD degree (26.6% of the academic staff of TEC). Costa Rican universities readily collaborate. Yet they could strengthen their interactions with foreign institutions. So could do Costa Rican scientists with highly qualified Costa Ricans abroad. Though challenging the skill gap, the country provides efforts to address the lack of equivalency in higher education, and further implement a system of recognition of qualifications. This strong political line is supported by public universities, and produces substantial results[3].

Costa Rica Institute of Technology (TEC)

TEC was created in 1971, in the provinces of Cartago. Creating TEC was aimed to build capacity in science and technology in order to move Costa Rica from a rural to a tertiary model. The domains cover fundamental and applied sciences. TEC aims to play a national and regional role in identifying, inventing and adapting new technologies through its own research achievement and international transfer of knowledge. TEC follows seven priorities: Water, Food, Culture, Energy, Housing, Industry, and Health. Its academic performance depends on several factors a.o.: the ability of TEC to increase knowledge and form talents (skilled managers, engineers, scientists…), the accessibility to learning from advanced technologies embedded in global goods and services, the appropriation of innovation returns, as related to the protection and strengthening of intellectual property. The Organic Law 4777 (Organic Law of the Costa Rica Institute of Technology) was embodied in the articles 1 and 3 of the Organic Statute (OS) on 9 June 1971 in view of spreading industrial activities in various provinces, improving the processes of agroindustry, modernizing agriculture and offering growth opportunities to remote provinces.

Education, Research and Service to the society at TEC

Teaching and research are developed in structural units corresponding to multidisciplinary and transdisciplinary strategic lines. Currently there are: 20 academic schools, and 7 academic areas including 10 research laboratories; 10 research centers reporting directly to the Research Council; services for academic support (about 836 equivalent full time including 11 PhD); 1 non-profit Foundation (FundaTEC) to manage research contracts and continuous training, and pilot extension services. TEC offers 3 academic degrees the programs of which execute 61% of total annual budget:
(i) Undergraduate: 4-year Bachelor and 5-year Licentiate; (ii) Graduate: 2-year Master degree; (iii) Postgraduate program: PhD degree. TEC offers 22 undergraduate and 17 graduate programs among which 50 % are accredited by four agencies.

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[1] OEDC (2017) Education in Costa Rica, Reviews of National Policies for Education. Paris: OECD Publishing. Recovered August 14, 2017, from http://dx.doi.org/10.1787/9789264277335-en

[2] Latin American and Caribbean area

[3] Office of Title Recognition and Equalization (National Rectors Council of Costa Rica –CONARE), ref. http://ore1.conare.ac.cr/index.php

Students and staff members at TEC

A staff of 1650 full time human resources performs academic duties (education, research and extension service). From 2008 to 2016, the number of students has increased almost by nearly 47%, reaching 11,879 students (70% study at Cartago Campus). This increase is particularly noticeable in Bachelor and Licentiate programs.

TEC governance

The institution is autonomous and spread out in several councils and structures of education and research. The OS[4] attributes responsibilities and roles to selected functions (e.a. Rector and Vice-Rectors), councils, and a number of groups making up the university community[5]. The democratic functioning of TEC relies on several bodies that promote participation in decision-making processes at different organizational levels. This approach also covers the main stakeholders.

Universities worldwide create and transmit knowledge to form autonomous, responsible and creative graduates able to innovate and make the future[6].

After 46 years, TEC has undoubtedly reached a turning point. As a matter of fact, the Institution is renowned: TEC radiates at both the national and regional levels, provides qualified graduates to serve the development of Costa Rica and countries from Central and Southern America. A step forward is clearly to build up a *Research University*[7,8] in science and technology.

Undoubtedly, achieving this goal is strategic for the future of TEC. It requires profound changes in terms of building up a *research culture* in TEC, especially:

1. to increase the financial and administrative support to research activities, and selectively support leading scientists and research units; encourage the regional and international mobility of academic staff and researchers;

2. to adopt international standards in research performance, and participate in international calls for research proposals, networks and congresses/workshops;

3. to pursue and intensify institutional efforts to encourage academic staff and researchers to publish their results in international peer reviewed journals;

4. to hire academic staff at PhD level and give a leading role to the Rector Council in the process of academic recruitment; take account of scientific production in the academic career;

5. to rationalize the structural organization of TEC to improve teaching and research performance, and further develop a research-based education framework in the line of the von Humboldt model[9];

6. to link institutional strategy and governance[10] wherein excessive participation in decision processes is presently an obstacle to TEC development to build up a *Research University*.

Achieving this is a breakthrough.

Implementing the 2017-2021 strategic plan of TEC is a mandatory step to initiate such a transition.

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[4]   Estatuto Organico del Instituto Technologico de Costa Rica
[5]   Roles and responsibilities of university community
[6]   Hirsch W.Z. & Weber L.E., *Eds.* (1999) Challenges Facing Higher Education at the Millenium. *The American Council on Education*, *publ*. Oryx Press, Phoenix, Arizona, 199 p.
[7]   Weber L.E. & Duderstadt, Eds. (2004), *Reinventing the Research University*. Economica, London, Paris, Genève, 254 p.
[8]   Weber L.E. & Duderstadt J.J., Eds. (2010), *University Research for Innovation*. Economica. Glion Colloquium Series N°6. London, Paris, Genève, 358 p.
[9]   Alain Renaut http://cippa.paris-sorbonne.fr/?page_id=1071 CIPPA, Séminaires 2016-2017
[10] Hirsch W.Z. & Weber L.E., Eds. (2001), *Governance in Higher Education* - The University in a State of Flux. Economica Ltd, London, UK, 204 p

II. CONDUCT OF THE EVALUATION

The National Rectors Council of Costa Rica (CONARE), the National Accreditation System for Higher Education (SINAES) and Hcéres signed a cooperation agreement on September 2016 to develop a partnership and exchange experiences and knowledge about evaluation of programs and processes in Higher Education institutions.

Then TEC applied for Hcéres accreditation at the level of the institution. Once the decision was taken, Hcéres appointed a panel of experts. The evaluation was further conducted in the following steps:

1. TEC: writing of the report "Self-Evaluation File Accreditation of Costa Rica Institute of Technology, 31 March 2017";

2. TEC: gathering of data at the institutional level to provide information about the areas covered by the evaluation;

3. Hcéres: analysis of the collected data and available information, organization of the mission (March-May 2017);

4. Experts panel: carrying out a series of on-site interviews at Cartago Campus, Costa Rica, 21-25 May 2017; collecting of additional and complementary data;

5. Experts panel: analysis of available data, results of on-site interviews, preparation and writing of the final report;

6. Experts panel: restitution meeting, Paris, 6 July 2017; exchanges with TEC on the final report.

7. Hcéres Accreditation Commission: decision on institutional accreditation, October 2017.

COMPOSITION OF THE EXPERTS PANEL

— Mr Bruno Delvaux, Professor in soil sciences, former Rector of the Université catholique de Louvain, Belgium, Chair of the experts panel

— Mr Daniel Puechberty, retired Professor, Institut National des Sciences Appliquées, Rouen, France

— Ms. Manon Plagnol, student representative, Bureau National des élèves ingénieurs, Paris, France

— Mr Stéphane Serfaty, Professor in electrical engineering, former Vice-Rector in charge of research strategy and scientific council, Université de Cergy-Pontoise, France

— Mr François Tavernier, Head of administration, Ecole normale supérieure Paris Saclay, France.

ON-SITE VISIT DESCRIPTION

The on-site visit took place on Cartago Campus, from May 21st to 25th, 2017. It was split up in 3 visits (including campus facilities, medical center, library, research labs…), and 26 interviews:

— 1 opening session with the Rector and his team
— 2 meetings with members of institutional Councils
— 2 meetings with campus' and schools' directors
— 2 meetings with faculty members
— 2 meetings with research and extension representatives
— 2 meetings with academic and business partners
— 10 meetings about governance and management with Vice-Rectors and services
— 2 meetings with students
— 1 meeting with the International partnership department
— 1 meeting with Quality assurance department
— 1 closing session with the Rector.

III. EVALUATION

AREA 1: STRATEGY AND GOVERNANCE

Field 1: The institution's missions and its strategic positioning

The mission of TEC was designated through the Organic Law 4777 (Organic Law of the Costa Rica Institute of Technology) embodied in articles 1 and 3 of the Organic Statute (OS) on 9 June 1971: "*Human resources training, research and extension within a framework of academic excellence, ethical, humanistic, and environmental standards are defined in this declaration as priority work areas*"[11]. This statement accords with worldwide recognized academic missions. Indeed, the University creates and transmits knowledge to form autonomous, responsible and creative graduates able to innovate and make the future[12].

TEC is assigned by Costa Rican authorities to perform academic duties in the field of fundamental and applied sciences: basic exact sciences; natural resources and environmental sciences; agriculture, biotechnology and bioengineering; infrastructure, energy, housing and civil engineering; economics and management; education in science and technology; application of technology and biotechnology to health and medical sciences, other fields of engineering, and information and communication technologies. This assignment was designed to support the development of Costa Rica. TEC was specifically requested to contribute to the current socio-economic transition of the country from a rural economy to a tertiary model involving added value based on science and technology in innovative approaches and projects.

Both the TEC mission and strategic positioning are thus precise and clear. So far, TEC has remarkably fulfilled its missions as far as training and extension services are concerned. Over the past 40 years, TEC has formed a number of graduates, principally at bachelor and licentiate degrees; TEC has provided qualified graduates to serve the development of Costa Rica and countries from Central and Southern America; TEC has established cross-fertilizing links with the private sector. The Institution is renowned in Costa Rica, Central and Southern America. TEC radiates at both the national and regional levels, and attracts good students. TEC enjoys an enviable reputation in Costa Rica but also in neighboring countries of Central America and beyond in South America. It is evident that the objective of providing the market with future professionals in science and technology is reached.

However, a major weakness of TEC at the present time is academic research.

Now well-established, TEC has the potential to further develop to rank as a major institution in science and technology in its continental environment through developing a real research culture. In other words, TEC has undoubtedly reached a turning point after over 45 years of existence. The academic authorities have taken the full measure of this turning point. They have conducted a participative, in-depth analysis of its institutional strengths, weaknesses, opportunities and threats (SWOT) as well as a deep reflection on its future. The latter is concretely defined in the TEC 2017-2021 strategic plan[13]. The vision is adequate to strengthen the institution in the global academic world, increase its capacity and attractiveness, and improve its academic performance. The vision aims to develop a modern *Research University* in science and technology, in other words to bring TEC into the 21st century. It is clear that further development of TEC relies on the profound strengthening of its research capacity at individual, structural, organizational and institutional levels.
Implementing the 2017-2021 strategic plan of TEC is a mandatory step to initiate such a transition. Indeed, this plan is going in the right direction because it is inspired by a modern vision of the University Institution. The realization of this plan will constitute a first major step in the transformation of TEC into a science and technology academic institution based on the Humboldtian principle of the fundamental link between research and teaching. The strengthening and development of research, as well as the link between research and teaching, are known to be fundamental to increase the quality of the three basic academic missions and (research, education, service to society), and thereby the quality of the academic institution.

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[11]   Self-Evaluation File Accreditation of Costa Rica Institute of Technology, TEC, 31 March 2017
[12]   Hirsch W.Z. & Weber L.E., *Eds.* (1999) Challenges Facing Higher Education at the Millenium. *The American Council on Education*, *publ.* Oryx Press, Phoenix, Arizona, 199 p.
[13]   TEC 2017-2021. Plan Estratégico Instituto Tecnológico de Costa Rica. OPI, Octubre 2016

Field 2: internal organization and strategy implementation

Governance

The governance of TEC is characterized by a system that systematically associates a board (council) with an academic or organizational authority. The organizational chart of TEC shows that at every level of responsibility, from the Rector to the schools, there are instances in place. This governance corresponds to the governance standards of the region. The rates of participation in the various elections demonstrate an attachment of the university community (including students) to this collegial dimension of governance. At the last elections for the Rectorate, the rates reached 86 % for academic and administrative staff and even 90 % for students. Each instance brings together academics (60%), students (25%), and administrative and technical staff (15%). It should be noted that the national or local authorities and TEC's economic partners are not represented in the institutional governance. The only seat they have is in the schools' boards where one alumnus has a member seat. This under-representation may be surprising in a "technological" university, in which training and research activities are, by essence, directly linked to societal issues. However, TEC develops a number of close relationship with external stakeholders. This accords with the social and societal role of TEC which is regularly recalled in institutional productions.

This governance is also significant in the interactions between TEC and national public authorities. Although Article 1 of the statute of the university affirms the autonomy of TEC, its dependence on the national authorities is very important since the State grant represents 90% of the resources of the Institution. This financial dependency is coupled with a very narrow system of control over the use of public funds. Beyond the regulatory control provided by the "Controller General of the Republic", the development of TEC must be part of the national development strategy as defined by the Ministry of Planning. Within TEC, this planning takes place at all levels of responsibility through the authorities, but also through a highly developed action monitoring system. To ensure the follow-up of this highly planned system, the university has set up a dedicated department: the Office of Institutional Planning (OPI). This administrative department is a real asset for the Rectory team and the institution (20 persons). It is a necessary institutional tool to deal with the complexity of its governance. The OPI articulates the levels of action in very clear and didactic productions: strategic, tactical or operational. This very incremental system is a condition of evolution of the structure within the framework of a polysynodic governance where the search for consensus is a practice deemed healthy and valuable in the heart of most Latin American public universities.

This governance is based on a very broad and much shared system of values which must regulate both the strategy of the institution and the individual behavior of its members. The action of all decision-makers must meet the strategy established by the central bodies: the institutional assembly (AIR or AIP) which corresponds to the Academic Senate and the Institutional Council (CI). AIP is the source of legitimation of the strategy through discussions and approval of the five-year strategic plan. The CI dominates the operation of the institution. It brings together 12 members, including the Rector, whose decisions on resource management are subject to approval. Nevertheless, the continuous search for consensus has detrimental consequences on the formalization of the TEC strategy. The five-year strategic plan 2017-2021 clearly describes the 17 general policies and the 13 strategic projects that will have to be implemented. These descriptions and the follow-up processes implemented correspond to the standards of a quality approach at the level of an academic institution (based here on thematic SWOTs). This institutional quality approach, however, may not be an institutional strategy, in the sense that the strategy is the result of limited choices. The very collegial governance of TEC can dilute its strategy in all the concerns of its community. It should be noted, however, that during the interviews the issue of research and its development was dominant. We strongly support that it should be more explicitly displayed as a major strategic priority in the years to come.

The TEC executive team gathers the Rector and four Vice-Rectors respectively in charge of Education, Research and Extension, Administration, Student Life and Academic Services: *Docencia* (VD), *Investigación y Extensión (*VIE), *Administración* (VA), *y Vida Estudiantil y Servicios Académicos* (VD).

From the point of view of academic leaders of internal academic structures, it should be noted that the organizational chart places 20 Schools and 7 Academic areas under the authority of the Vice-Rector. The heads of these structures report to the Vice-Rector but they are not appointed at Rector's level. A school principal is elected by the school board and, therefore, cannot conduct his/her action in a logic of loyalty towards the school team. Possible conflicts of loyalty can thus complicate the implementation of the overall strategy. TEC has 6 sites including the main site. As a site, San Carlos is a regional headquarter enjoying a certain academic and administrative autonomy. So it may have its own administrative structure and schools which depend on its own management, and not on the Vice-Rector for Education. The director of the San Carlos site has the rank of Vice-Rector. Other campuses are called "*centro academico*". They have no academy autonomy or dedicated administrative departments under the hierarchic authority of the Site Director. This prevents the scattering of administrative and technical resources as well as the differentiated administrative procedures.

Structural organization

The organization chart displays a range of classical administrative and technical departments for an university (finance, human resources, computer system, legal, real estate, supplies, communication and planning, and project management). All these departments were able to produce the technical responses and data required by the experts. The Rector and the Vice-Rectors do not have only an academic and strategic responsibility; they also have a direct responsibility for technical and administrative departments (training, research and campus life). Academic leaders and administration seem to collaborate very closely. The administrative competences related to the control and monitoring of the activities are highly developed but the prospective dimension and performance monitoring (including Human Resources and Finance) remain to be developed (as it is mentioned in the self-evaluation document). In order to take this leap, the position of experts in administrative and technical services and their coordination can be considered. It seems that TEC can develop a better sharing of strategic issues (and an integration of these issues in the day-to-day work of the Department managers) between the academic leadership team and its administrative and technical departments. The productions of the planning (OPI) and communication departments show that this sharing and integration are fruitful and useful. This symbiotic approach between academic and administrative staff may be generalized. This closer collaboration is also a condition for an evolution of the steering system towards an approach monitoring the activities. The approach analyses the results and therefore the performance of the various actions, first planned by the authorities, and further implemented by the managers. At first, there are some very technical issues (linked to monitoring and financial issues) but to spread them into every part of the academic community, it has to be supported by the academic leadership. There is no specific and professional manager to coordinate the administrative departments divided between the Rector and the Vice-Rectors. This new function could create stronger synergies and free academic team for responsibilities and tasks that could be delegated to an expert. The quality program for the development of excellence in management decided by the institution may support this change for administrative and technical organization.

Field 3: The institution's identity and communication

TEC benefits from a strongly shared values system around the quality of training, the development of research and the sustainable and global development to support its communication. TEC has demonstrated its interest for this stake since it was consecrated as one of the institutional values by the 3rd institutional congress. The importance given to communication is linked to the TEC's desire to be an actor in the development of Costa Rica and to demonstrate the positive impact of its action on the development of the region. The communication and marketing department, directly attached to the Rector, has implemented all tools needed for institutional communication in support of the diffusion of the image and the values of TEC. A multidimensional graphic charter irrigates all the institutional productions (documents, website, signage, promotional items...) and the website (recently completely redesigned).

The communication and marketing department set up various productions (Investiga TEC magazine and Investiga TEC portal) and events (symposiums, seminars and informal meetings around innovation) to support the institutional effort for developing research activities. Linked to training issues, external communication campaigns for TEC promotions are being set up, including regional television ads, which corresponds well to its area of student's recruitment. The TEC graphic charter is declined on all productions that we have been able to consult. On the campus, the same professionalism can be observed on all visible supports (including signage).

Student communication benefits from a strategic partnership between the communication service and the federation of student associations (FEITEC) particularly around digital communication. This dimension has been the subject of improvement in recent years with the change of the website and the redesign of the platform of courses and online services. The impact of these tools (in particular digital tools and periodicals) has to be better assessed in order to adjust the priorities and means of communication closest to the strategy.

AREA 2: RESEARCH AND TEACHING

Field 1: Research policy

Red line

To increase its performance in Education and Research, and enhance its regional attractiveness aligned with Costa Rica's development policy, TEC institute aims to become, in the future, a *Research University* of science and technology covering a range of advanced disciplines, and carrying out research within international standards. This is the red line of the research policy of TEC, as defined by the current Rector Council. This policy is led by both the Rector and Vice-Rector for Research and Development (VIE) at the institutional level. Defining this policy is required to challenge some of the following defaults a.o.: (1) a lack of research culture at institutional level, (2) a weak performance in terms of number of publications in international peer reviewed journals, (3) a structural scattering[14] of research entities and the multiplicity of equipment/infrastructures that should best be shared to increase TEC efficiency, (4) a relatively small proportion of academic staff members holding a PhD degree[15], (5) a poor attractiveness at international level… It is interesting to note that the policy defined at TEC to challenge these defaults is shared with other national universities in Costa Rica. Indeed, they all point the crucial need to strengthen research at individual, organizational and institutional level.

Academic coordination at national level: CONARE

Yet at national level, TEC is not isolated in his strategy: this is a very strong point. TEC is an active member of the *Consejo Nacional de Rectores* (CONARE) [National Rectors Council]. CONARE brings together the rectors of the five public universities in Costa Rica. This council works on academic political issues that have been previously dealt within inter-university committees: teaching, research and valorization; student life... For all these issues common to public universities, CONARE provides a platform for dialogue with external stakeholders such as the public authorities, the private sector, international investment funds, etc. For example, discussions between CONARE and the government involve funding and the development of a scoreboard of national universities. CONARE also federates and catalyzes common inter-university initiatives, such as the "Joint PhD 3-year program" focused on research in each university, and aimed at increasing academic and research staff holding a PhD degree. Coordinating well within CONARE is a real force in the dialogue between universities and public authorities. It seems to us extremely important that national universities express their common vision to the government in order to increase financial support for research. Let us recall that the public funding for Education amounts to 8% of GNP, all levels included (from kindergarten to higher Education), and 1.5% of GNP for Higher Education[16]. The public investment for science and technology has recently increased from 0.5 to 0.6% of GNP, in which the allocation to universities accounts for over 50% relatively to the private sector. A special effort is devoted to innovation and technological development. This is the good way since the mandate of CONARE covers all the academic missions of public universities.

Involvement of TEC in the national development

TEC actively contributes to the national five-year program defined in "National Science, Technology and Innovation Plan". In accordance with this plan, seven priorities areas are investigated in TEC laboratories, and contribute to the expansion of Costa Rica's innovation policy in complementarity with other national universities in the following fields: Construction, Health Sciences and Biotechnology, Economic Sciences and Business Administration, Education, Engineering (chemistry, material science, electrical and computer), and Natural Resources (forestry, agro industry, sustainable agriculture…).

TEC Institutional organization

Currently, the organization is scattered. A new political line involves a necessary restructuring. It is required a.o. to share equipment and infrastructure, encourage cross-fertilizing from different scientific domains, increase the critical mass of researchers, improve the visibility of research, and contribute to the attractiveness of TEC. As members of the Evaluation Committee, we strongly support this line. Practically, a new configuration is initiated and managed by the Vice-Rector for Research and Extension (VIE). It involves multidisciplinary research groups, and benefits from a World Bank support: 10 Research Centers were selected and created on the basis of their research activity. These centers bring together teams of researchers in related areas of

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[14] The Panel of Experts is aware of the fact that TEC authorities want to decrease the present scattering.

[15] This is a common fact in Latin America. The Panel of Experts welcomes the efforts made by TEC authorities and encourages them to continue in this direction.

[16] The European objective proposed by the Lisbon treaty fixes the investment to research at 3% of GNP (combining both the public and private supports).

knowledge, and can provide research services or links to social and production sectors through open innovative platforms. At the organizational level, they have a unit rank which allows them to access to human and financial resources, as well as a mid-level of administrative independence. In addition, 8 Schools have created 10 research laboratories, the size of which is smaller than centers. These laboratories are not affiliated to any of the above-mentioned research centers. They are linked to the relevant thematic academic unit or directly to the Research Council. These new measures are aimed to reduce the scattering of research entities. Taking into account the weak research potential, the restructuring actions described here above should be supported in order to focus to the research activity. In the long term, these entities are called upon to replace the multiple structures dispersed in the institution.

Incentives at individual level

Yet current performance levels, as evaluated in terms of bibliometric indicators of knowledge and technological production, are low. Indeed, though the number of international peer reviewed publications increased since 2013, it reaches only 56 in SCOPUS, and 30 in the Web of science in 2016. This is low. It is not an indicator of excellence from the research point of view. Besides, the institution holds its own but reputed book publishing house service stemming from work done by TEC teachers and researchers. Of course this is important. These books are indeed mainly intended for students and field actors (politicians, developers, engineers ...) in Costa Rica. They may have a regional audience, but they contribute very little to the international visibility of the research carried out at TEC. Both publishing international papers and editing textbooks are necessary, but they should be better balanced. The VIE presently develops a policy to encourage research activities as well as the researchers themselves. For instance, some key measures have been recently taken:

1. To identify the researchers who are not the most productive, but who exhibit a promising potential, to apply to research funds, and provide an annual monitoring to assist them in the development of their research.

2. To provide a partial reduction of teaching: any professor involved in a funded research program receives a teaching waiver equal to his research investment. The courses are then arranged by an alternate (Teaching Assistant), the wage compensation of whom is covered by TEC.

3. To attract highly qualified scientists through a)hiring academic staff holding a PhD degree, b) to encourage the return and reception of high-level Costa Rican researchers working abroad with specific extra salary.

4. To evaluate the research outputs at individual level, especially with the use of a data base created at TEC level which gathers the research articles published by staff members (sources: Web of Science, Scopus).

5. To encourage the regional and international mobility of academic staff (incentives were not very successful so far).

6. To evaluate the research proposals and promote their trans/interdisciplinarity.

7. To increase the financial support for research activities from both external and internal sources.

8. To coordinate support with FundaTEC

9. To coordinate the selection and acquisition of new equipment with the Vice-Rector for Education.

Most likely such a policy will increase the quality of research. This policy, initiated by the VIE, must be supported and amplified. Such incentives will bear fruit in the long term. They will help to foster the development of research. Strengthening the latter will, in turn, contribute to increasing the international visibility of TEC. Particularly fundamental research requires a specific institutional support.

Research planning

Of course academic freedom may conflict with institutional research planning. The very basis of research is individual creativity. Yet developing a policy of incentives to boost creativity and scientific research is crucial for the future of TEC. A "top-down" planning should best develop a framework in which full academic freedom can be practiced and expanded, notably through developing an institutional policy involving the culture of project and evaluation. A minimum planning has been initiated in a very good direction a.o.: revisiting the structural organization and the administrative support for research (through a better coordination of services); reducing the number of research priorities, defining broad but relevant objectives as well as a strategical positioning in national and regional rank...

10. A policy of incentives has been initiated, as described in previous sections. This policy is based on both an internal diagnosis and a deep appraisal of what is an academic institution. Some selected measures illustrate this: increasing the financial and administrative support for research; selectively supporting leading scientists and research units; encouraging the regional and international mobility of academic staff and researchers; encouraging them to publish their results in international peer reviewed journals, and participate in international calls for research proposals, networks and congresses/workshops; hiring academic staff at PhD level; taking account of scientific production in the academic career.

11. Such incentives will be amplified by complementary measures: adopting international standards in research realization; attracting international visiting scientists and professors; rationalizing the structural organization of TEC to share equipment and infrastructures, improve teaching and research performance, and further develop a research-based education framework in the line of the von Humboldt model[17]; linking institutional values, strategy and governance[18] wherein excessive participation of staff members is presently an obstacle to TEC development to build up a Research University; giving a leading role to the Rector Council in the process of academic recruitment. It is extremely curious that the Rector Council is completely out of the academic recruitment though this process is extremely crucial for the future of the Academic Institution.

FundaTEC

The export-led growth model anchored on fiscal incentives granted through free trade zones is highly effective in attracting international activity in advanced manufacturing sectors[19]. This model has to be connected with the process of attracting foreign direct investment boosting high level employments in environmental, new technologies, and health and well-being issues. This context is a real opportunity for TEC to generate income through remunerated technology transfer activities. As a significant result for research support, the *Institutional Development Fund* FundaTEC has allowed a 51% increase in the resources allocated to research and extension in 2015 compared to 2012. As mentioned here above, FundaTEC support is being increasingly coordinated with the research policy of TEC. We strongly support this line. Yet we believe that it could be strengthened by building up an ecosystem particularly dedicated to the tryptic research-valorization-return to TEC, as proposed here below.

Extension and valorization

As confirmed through the on-site interviews, TEC benefits from a large external network of socio-economic partners that can extend its impact within the society. Regarding this excellent context, collaborative research projects between TEC and enterprises remain too modest. The governance of valorization is headed and piloted by the VIE department for research and extension. Besides, FundaTEC and technological platforms are available in each research center. These two pillars, one internal and the other external, constitute a force to develop an effective policy of valorization and sourcing of return to the university, in terms of intellectual property and financial resources. The basic structuration (2 pillars) is thus already available. It has in fact the capacity not only to exploit the scientific and technological outputs of TEC entities, but also to incubate and invest in the creation of spin-offs and start-ups. Yet incentive actions towards academic and researchers are still needed to reinforce the extension activity (only 2 patents, 7 brands, 6 authors).

To support the above two pillars, and to further strengthen extension and valorization, two suggestions can be put forward. Firstly, we suggest that TEC should strive to better organize the transfer of the technologies it generates, while remaining attentive to all aspects related to the protection of intellectual property. To this end, the creation of the *TEC Technology Transfer Office* (TEC*TTO*) would enable the research community of TEC and its partners to be supported from project set-up (with associated funding) to knowledge transfer, through the detection of valuable results and their confrontation with the market. Some of the possibilities that the TEC*TTO* should offer the TEC partners are: to know precisely the research potential of TEC, identify the right research partner and establish a partnership with TEC, get access to collaborative and technology offers, share experience with young researchers-entrepreneurs, participate in support committees of entrepreneurial projects… The Liaison center could evolve towards an efficient TEC*TTO* since it already provides a strong link between TEC and external productive sectors.

Secondly, in the longer term, the TEC Innovation Network (TEC*IN*) could be created. It could be a network set up at the initiative of TEC, which would bring together university-related partners around the promotion of

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17 Alain Renaut http://cippa.paris-sorbonne.fr/?page_id=1071 CIPPA, Séminaires 2016-2017.

18 Establishing such a link is strategic for human and humanistic organizations: (1) de Woot Ph. (2009) Lettre ouverte aux décideurs chrétiens en temps d'urgence. Lethielleux/Desclée de Brouwer, 215 p. ; (2) Hirsch W.Z. & Weber L.E., Eds. (2001), *Governance in Higher Education* - The University in a State of Flux. Economica Ltd, London, UK, 204 p.

19 "OEDC reviews of innovation policy: Costa Rica 2017".

entrepreneurship and innovation. All partners would aim to support and equip innovative and entrepreneurial projects in order to encourage the creation of new companies. The amplification of this network from the present Business Incubator would make it more visible to the public concerned by the offer available in a very dense space: training, coaching, sources of funding, co-working spaces, offices and services ... and to develop the resources that are at their disposal within the university and through its partners. Partners could be: (1) TEC (with other academic partners?), (2) FundaTEC (with other investment funds?), (3) the *Colegio de Ingenieros Tecnólogos de Costa Rica* (CITEC)[20], (4) incubators (hosts of young start-ups and innovative SMEs), (5) a platform "*Mind and Market*" from the TEC-enterprises partnership, (6) science parks.

TEC*IN* would be aimed at 1) TEC researchers who want to value the results of their research, 2) prospective students who are already involved in entrepreneurship, 3) TEC students who have completed their studies, have the desire to create a start-up and need financial and structural assistance, 4) innovative projects, be they TEC or not, 5) young companies wishing to expand, 6) investors wishing to connect with the academic community to create and develop their business, particularly through university research. To investigate these two suggestions from a feasibility point of view, examples from universities abroad could be helpful. Also the ALUMNI network, important and active in the national socio-economic environment, could give assistance. We believe that TEC*TTO* and TEC*IN*, if created, could create with TEC and FundaTEC a comprehensive ecosystem aimed to extend better the research action of TEC into the society.

Last but not least, adequate training is needed to support any innovation project. TEC*IN* would offer companies an executive program in innovation management. This training would aim to provide innovators of tomorrow with all the global knowledge needed to carry out an innovation project, in particular the managerial, economic and networking dimensions. This very concrete program would make it possible to use the project on which the innovator works in order to valorize the training immediately and validate his "business project" with obtaining his university certificate. For instance, TEC*IN* could offer half-day workshops organized at the request of companies and supervised by innovation experts from TEC or other universities.

Field 2: Teaching policy

General purposes

In 1971, TEC was created according to the model developed by Georgia Tech University or by the Technologic Institute of Monterrey in Mexico. The teaching policy of TEC is defined as part of "*the National Science, Technology and Innovation Plan*", a five-year national program in which engineering and technological education is a major issue. The special missions historically assigned to the institution place TEC in a unique situation among public Costa Rican universities. The teaching policy is recalled in a recent operative document[21], as adapted to the evolution of the external context. The purposes are as follows (*in Spanish*):

— *Formar profesionales en el campo tecnológico que aúnen al dominio de su disciplina, una clara conciencia del contexto socioeconómico, cultural y ambiental en que la tecnología se genera, transfiere y aplica, lo cual les permite participar en forma crítica y creativa en las actividades productivas nacionales.*
— *Generar, adaptar e incorporar en forma sistemática y continua, la tecnología necesaria para utilizar y transformar provechosamente para el país los recursos y fuerzas productivas.*
— *Contribuir al mejoramiento de la calidad de vida del pueblo costarricense mediante la proyección de sus actividades a la atención y solución de los problemas prioritarios del país, a fin de edificar una sociedad más justa.*
— *Estimular la superación de la comunidad costarricense mediante el patrocinio y el desarrollo de programas culturales.*

Principles of the teaching policy

The "*Plan Annual Operativo*", p.21, specifies the teaching policy in full accordance with the above general purposes. Briefly, this policy aims to (1) develop academic programs of excellency in science and technology; (2) provide their access and facilities to student populations; (3) ensure the continuous improvement of these programs with a view to excellence, respecting the principles and institutional values; (4) stimulate and consolidate in these programs a global vision, a culture of communication, internationalization and entrepreneurship; (5) plan and execute academic processes by minimizing negative impacts on health and the environment; (6) develop human skills through motivation, learning and the ability to position academic excellence in a humanistic perspective integrating respect for the environment and a culture of peace. The

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[20]   The *Colegio* brings together TEC graduates. It was created in application of the Ley N°6321 (27 Abril 1979), Artículo 7 "*sus graduados podían incorporarse al colegio professional donde sus careras fueran afines*".
[21]   TEC-OPI Plan anual Operativo 2016, Octubre 2015.

training policy is concretely translated into the development of various approaches, including project-based learning. The aim is to promote the contextualization and assimilation of concepts from case studies in order to develop technical expertise and know-how in human contexts. Attributes are defined as "*nociones que expresan conocimientos, habilidades y actitudes que consideran los mínimos necesarios de cada campo disciplinar y garantizan que los graduados están en capacidadf de desempeñarse de manera eficaz en diferentes contextos y situaciones, y les permiten comprender et mundo en influir en él*"[22].

Teaching structures and domains

Structures. TEC is presently divided into 20 Schools and 7 Academic Areas, only one of which offers its programs over the whole country (Computer Engineering). TEC presents a wide range of training courses (22 undergraduate programs, 15 master's and 3 PhD). TEC has 6 campuses allowing teaching programs to be delivered all around the country, most of the students being located at Cartago Campus (70%).

Domains. TEC is historically well-known in 4 main academic areas: Technology and Engineering Sciences, Technology and Earth Sciences, Economics and Administration, Technology and Education. Undergraduate teaching programs consist of 4-year bachelor and 5-year Licentiate degrees. The graduate program consists of a 2-year Master degree. 23 programs are accredited by regional, foreign, and national agencies: 13 by SINAES (National System for Accreditation of Higher Education), 8 by CEAB (Canadian Engineering Accreditation Board), 1 by ACAP (Central American Agency for Graduate Accreditation), 1 by ACAAI (Central American Agency for Accreditation of Architectural and Engineering Programs).

Administration. The academic administration is located at Cartago Campus. The teaching activities are managed and organized by VD for the programs with Bachelor's and Licentiate degrees. The allocation of human and financial resources is decided collegially by the Rector Council and further approved by the IC, according to strategic institutional priorities. The Vice-Rector for Administration (VA) manages an annual budget assigned to the Vice-Rectors whereas each Director of the Academic Department manages the budget specific to his/her missions. The teaching activities represent about 61% of the institutional budget. Responsibilities in Teaching are assigned in a hierarchical order from the Vice-Rector for Teaching (VD) and its Council, to the Directors of Departments and Academic Areas and their Councils, and further to the teachers. For postgraduate programs, the responsibility is hold by the Postgraduate Direction that belongs to VIE, but in close relationship with VD. In the Departmental Councils and Academic Areas, these aspects are managed comprehensively through the Postgraduate Units. The lack of coordination between the schools and the central administration reflects a difficult balance between centralization and autonomy in the management of each unit and the development of projects within an integrated vision at the Vice-Rector level. This may affect the institutional harmonization in the implementation of the TEC policy. The committee recommends a close coordination between the schools and the central administration in order to define a real policy for the teaching programs and their synergies.

Students
The number of students applying at TEC is high, but about 10% of the candidates are accepted for registration as shown in the table here below.

	Candidates	Studied candidature	admissibility	allowed	registered
2012	13 559	11 485	4 547	3 672	1 794
2016	19 422	16 564	8 393	4 107	2 146

The student is admitted if he/she reaches or exceeds an admission grade made of, for 40%, his/her grades obtained previously and, for 60%, the grade obtained in Academic Aptitude Test. This admission grade varies annually. Besides, a student may be exempted from the Academic Aptitude Test based on: the provenance of other recognized higher education institutions, re-evaluation of courses, re-evaluation of professional qualifications, specific agreements (e.g. between universities members of CONARE) and in the context of student exchange. Since 2012, the number of registered students at TEC has been maintained constant. The repartition of these students in the different degrees is summarized here below:

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[22] TEC. *Atributos de Egreso en Carreras de Ingenieria – Metodología de evaluación por resultados*. Meza Badilla E.C. *et al*. Ed. TEC 2017.

	Bachelor	Licence	Master	PhD
2012	2 867	5 390	1 394	38
2015	3 170	6 580	1 585	54
2016	3 480	6 847	1 402	40

The committee points that, in 2016, only 1400 students are enrolled in postgraduate programs, and 40 in a PhD program. This small proportion of students enrolled at MSc and PhD levels can be correlated to the small proportion of academic staff holding a PhD degree (15% from 803 professors (equivalent full time)). As already stated above, we strongly recommend that academic staff should be hired at least at PhD level, and, possibly after a postdoctoral stay abroad. Applying such a measure will definitely improve the quality of the formations offered by TEC as well as the one of the research carried out at the institution. We strongly recommend it. In this line, such a measure should be applied soonest to the candidates applying for a researcher position provided that the corresponding employment profile is beforehand defined in concertation with the Vice-Rector for Research and Extension. TEC sustains a lifelong learning strategy. The institution offers education knowledge courses for personal employees or for professional reasons. This activity is managed by TEC's internal structure. FundaTEC provides ongoing education and professional updating for the productive sectors, which may also include the programs that some schools develop to update their graduates.

It is obvious that over the past 25 years, TEC has fulfilled his major objective in that it has formed a number of experts in science and technology to support further development of Costa Rica. Besides, TEC has developed a collaborative network with Alumni and major actors from the Enterprise. From this network, but also from other stakeholders (private sector, public universities, Government...), it is evident that TEC has really and deeply contributed to the development of Costa Rica and the emergence of a new society through its role in forming professional experts in science and technology. To further increase the quality of education and strengthen such collaborative networks, TEC should further support its teaching on research. A better teaching-research linkage needs to be established. In this respect, the proposed new regulations from the TEC research policy are to increase the quality of education.

Field 3: Link between research and teaching

Two aspects are envisaged:

— the learning of research by the students themselves;
— the academic research-based teaching as conducted by academic staff

a)   The learning of research by the students

There is no introduction to research for students neither in the Bachelor cycle nor in the Licentiate degree. Research courses are planned in the Master program. Students are offered the possibility to participate to research projects. MSc and PhD students are working at TEC in the framework of research contracts (i) established with companies, or (ii) funded through institution's project. Thereby they carry out research activities as part of their final project study or of their PhD program.

Number of student research projects, and of graduate students involved in a research projects

	Number of student projects	Number of students	Number of research projects	Total number of researchers
2012	7	21	117	181
2015	13	23	180	299

As illustrated here above, the number of research projects increased by about 75% between 2012 and 2015. This evolution might be correlated with the increase of researcher staff during that period. The policy of the VIE thus appears to produce very reliable results. The move forward looks good but there is still a way ahead.

Indeed, roughly below 1/3 of the graduates continue for postgraduate studies[23]. New inciting measures are likely needed to increase this number.

In 2016, 40 students are registered in the 3 PhD courses[24] for 128 EFT researchers (PhD level). Some of them carrying out their research work in the University of Costa Rica (UCR) within the framework of a MOU between TEC and UCR. This number is small as compared to the one of MSc students. Yet the number of PhD students is expected to increase following the Vice-Rector policy in the five next years.

Another promising process initiated by the VIE aims to develop scientific research in the institutes, and build capacities (teachers and auxiliary staff). The institution encourages professors to carry out a PhD thesis in foreign universities. This is in line with further development of basic science at TEC in agreement with international standards.

b) academic research-based teaching

Universities are not professional schools. They are assigned to create and transmit knowledge in order to form autonomous, responsible and creative graduates who will be able to innovate and make the future[25]. This implies that academic staff members should teach and do science. In other words, professors are expected to feed their teaching by science as experienced by their own research experience as well as by the knowledge gathered worldwide. The direct way to meet that challenge is to hire academic staff at PhD level, and, ideally, after a significant postdoctoral stay abroad. Though we already recommended the set-up of such strategic procedures in preceding sections, we wish to insist on that crucial point: carrying out a PhD thesis is mandatory to teach at University level and to supervise research activities in a professional way.

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[23] *Gestión Institucional 2016.ppt*

[24] *TEC at a glance*

[25] Hirsch W.Z. & Weber L.E., *Eds.* (1999) Challenges Facing Higher Education at the Millenium. *The American Council on Education*, *publ.* Oryx Press, Phoenix, Arizona, 199 p.

AREA 3: STUDENT ACADEMIC PATHWAYS

Field 1: Academic pathways, from career guidance to employment

Entrance. TEC imposes an entrance exam to candidates prior to student registration. This test is purely logic: it contributes to compute the admission grade[26]. 80% of the students accepted at TEC come from public schools in Costa Rica, and exhibit heterogeneous profiles. A number of candidates are foreign applicants who applied from 50 countries from 2009 to 2015[27]. The most important contingent comes from Nicaragua (80-250/year), followed by Colombia (15-60), El Salvador (1-23), Venezuela (2-20), Cuba (1-14), Honduras (0-13), Panama (1-10), Peru (0-10), Argentina (1-7) and Chile (1-2). Others come from the United States, Canada, Taiwan and People's Republic of China. A very small number are European nationals. Since the students' profiles are very heterogeneous, TEC offers a high-level guidance process for students. The institution believes that the Academic Aptitude Test is not a strict selection of the best students, but that it opens higher education to everyone. As a matter of fact, quite a number of students hope to study at TEC. The attractiveness power of the Institution originates from the double fact that (1) public universities in Costa Rica are renowned, and that (2) TEC is the main public university that offers programs in engineering and, more generally, in science and technology. As illustrated here above, its attractiveness goes beyond national borders.

Integration. Once registered, the student is involved in his/her curriculum. He/she first follows an upgrade program to integrate him/herself into the institution study program. Besides, both the psychology department and INTEGRATEC (a program supporting student integration) provide guidance for the students: the psychology department helps them in their academic pathway, and INTEGRATEC in tutoring. TEC has two different types of tutoring: one self-supported (192 tutors for 2000 students), the other one supported by CONARE (40 tutors for 1900 students). Students in charge of tuition have a scholarship. Before choosing their academic path, students can undergo a test on line to evaluate whether they have the qualifications to follow the courses or not. Advanced students can also advise young ones. In case of failure, TEC observes that the repeaters do not abandon; instead, they repeat another year with specific courses. Well organized and really attentive to the student's needs, the service demonstrates the willing of TEC in making student's successes. This service might be further developed by including more the advanced students. A solution would be, for example, to develop some mentoring.

Internship. TEC does not yet have a platform where students can check where the others have made their internship. Yet it would be interesting to track the internships and keep relation with firms and labs by developing an internship platform. First of all, it will permit to professionalize even more this process and to enable students to find internship more easily (even more for international internships). It will also enable TEC to develop close relationships with some new partners whatever they are (firms, labs…). In practical terms, TEC could easily establish a database of contact information for companies and organizations hosting trainees. This database should also integrate the nature of the training courses and a reciprocal appreciation of the host company and the responding professor in terms of follow-up of the internships. TEC could also motivate students to extend such a list to diversify opportunities, knowing that motivated students may have contacts that can be valued in this way. We believe that such initiatives readily contribute to the establishment of an advanced "community-building" associating students, professors, and external actors.

Alumni. The alumni are included in the process of student guidance since they are part of the school council and have close relationship with their original school administration. However, presently, they are not members of the institution executive councils, but of the Institutional Council and the Representative Institutional Assembly. The alumni are key stakeholders as far as market needs and professional insertion are concerned because they actively practice it. Increasing their participation in the executive governance units could be of added value at institutional level, not only at school level.

Valorisation of student involvement. TEC has a valorisation system of student involvement in governance and student life, including sport and cultural activities. The valorisation goes through a system of scholarships or the exoneration of inscription fees. Moreover, they also can get a specific diploma from TEC which recognizes their involvement. So far, this recognition does not cover the involvement in student associations. We think that it is a responsible position. We believe indeed that associative/institutional involvement is first a personal initiative which strongly contributes to the self-edification in a number of dimensions: practicing team work, building team spirit, investigating issues, defending causes, … Nevertheless, we encourage TEC to continue to provide means to support student life.

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[26]   as specified in the Self-Evaluation Report, Area 2, Field 2
[27]   TEC. Compendio Estadístico 2009-2015. *Officina de Planificación Institucional* (OPI) – *Sistema de Indicadores de Gestión Institucional*, 2016.

Students in institutional governance. Students are represented in all the councils of TEC. Therein, they represent 25% of the elected members. They are mandated for only one year with a handover of 3 months. It appears that students deeply invest themselves and get involved into the academic processes. Nevertheless, the 1-year student mandate may be too short. Extending it to 2 years, but only in the higher instances (Institutional Council and AIR) might further develop student implication in the institutional life and dynamics. In the same line, as stated above, the representation of alumni in institutional instances could bring an external and societal point of view useful for the future development of TEC, particularly in student life and academic paths.

Field 2: Learning resources

Capacity and access. TEC has one library at Cartago Campus which can welcome 780 persons, i.e. around 10% of Cartago students. This library also offers computers (27) and working spaces. The library and surrounding spaces are open from Monday to Friday from 7:10am to 8:00pm, and Saturday from 8:00am to 4:00pm. TEC is building a new library on Cartago Campus. It is planned to be fully digital, open 24h/7d, with some staff during the week days. It will have a welcome capacity of 283 persons. The all connected buildings will have a.o. computer labs, kitchens, and open spaces. Currently, TEC has 40 databases of scientific publications focused on engineering and sciences. 60% of the global budget of the library goes to digital resources. Enlarging the opening hours of the library would be interesting provided that staff conditions may allow it.

Computing facilities. Fellows are offered computers (around 30) to be borrowed without any caution deposit. This program is efficient: in less than 3 days, all the computers are rented. Nevertheless, a lot of students are on waiting list. It could be interesting to develop this program. Indeed, without a computer it is really hard to study nowadays.

Soft skills. TEC offers books and digital resources to academic fields outside that of engineering. It enables the students to open their mind to others domains and topics.

Foreign languages. Let's take the case of English language: students only have two compulsory semesters of English during their studies. If TEC wants to be visible on the international scene, a.o. by sending and welcoming students, it is needed to develop the English competences of the students.

Field 3: Learning environment

Authorities. The Vice-rectorate for Student Affairs and Academic Services (VD) has 141.47 full time equivalent persons to manage various programs and maintain the link with students. It appears to be well-known by the students and readily accessible.

Accommodations. TEC currently has two residences, one in Cartago Campus, the other one in San Carlos Campus. The first one has 202 beds (3 students per room). Each room has one bathroom and there is a shared kitchen. They are finishing the interior decoration. This new residence will welcome 200 students and they are hoping it will be opened during the next semester. In San Carlos, the residence possesses 400 beds (4 students per room). Such accommodation facilities are provided to students having very low financial resources.

Medical Assistance and facilities. TEC possesses a medical center where students have access to 4 generalist physicians, 2 nurses, 3 psychologists, 3 dentists and 2 dental assistants, 1 nutritionist. The access (except for dental care for students without scholarship) is free. The medical center has developed a comprehensive prevention policy for many purposes such as alcoholism, sexual infections, and drugs. They are using a lot of ways of communication like conferences, papers and also lessons (for young parents for example). They also offer screening tests. According to the medical center, the most acute health problems consist of stress (burn-out) and psychological affections. They are challenged through conferences during the annual *Health Week*, screening tests, and adapted therapies. Medical services are currently saturated even though the thorough prevention developed by TEC. Extending the opening hours and developing these services looks really important for the community. TEC has also developed an ambitious program to help students with children which include: scholarships, gardening for children and health care system for children. Currently, 60 children, mostly of single mothers, are cared for in this setting.

Student life. TEC has a number of student associations. Each school has its own association. The various associations are federated at the TEC's level by FEITEC. FEITEC manages all the elective student life of TEC; it spreads the global budget to other associations thanks to a specific fee[28] that all the students pay at the beginning of the year. FEITEC develops close and fruitful relationship with the Vice-Rectorate VIDA, but remains independent and autonomous. The school's associations take care of the School Council and of the School

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[28]   1700 Costa Rican colons (2,65€)

Week. Indeed, each school has one week during the year during which their student's association organizes conferences and others activities. In order to maintain good relations between students of all the campuses, TEC could go on supporting financially the events between campuses. In fact, this would increase the sense of belonging (*affectio societatis*) to TEC, and allow students to meet with each other, and share good practices. Cultural and sport activities are also part of TEC. During their academic *cursus*, students must choose 3 cultural or sport activities to validate their diploma. Besides, leisure activities are offered by the School of Sports and Culture. Students can thus have free access to various activities (dance, painting, music, football…). Also, they have access to fitness centers, swimming pools and other infrastructures (musical instruments…). The Cartago campus extends over 88 hectares, and is well-organized. The sport infrastructures are in good condition thanks to the intervention of dedicated staff. Nevertheless, these activities suffer from a lack of space. Likely new facilities might become available to develop soft skills, and to offer extra-academic activities to students.

International students. Undergoing the entrance test requires either to move to the TEC campus or to cover the travel cost of the TEC examiners abroad. Besides, international students do not have specific facilities for accommodation, though TEC provides a short list of families ready to welcome foreign students. Facilitating the process of entrance and developing a specific accommodation program for international students would undoubtedly increase the attractiveness of TEC at regional and international levels.

Scholarship program. TEC carries an ambitious scholarships program, thereby challenging an unfavorable socio-economic context in which many young people are not able to study without financial support. In fact, around 6000 students have access to some kind of scholarship which can have different forms: inscription fees' exonerations, mobility helps for example. Nowadays, the entire allocated budget is used; the scholarship service can meet 100% of student demand. There is a control process of the student demand made by social aid in the families in order to verify and consolidate the information given by the students. The scholarship program is a great strength of TEC which has to be maintained and developed in order to give access to higher education whatever the socio-economic condition of the candidate.

"Community building". TEC obviously pays special attention to students and student's community. The institution offers a wide spectrum of activities, services and supports to provide access to higher education, and to enable the students to succeed their studies.

AREA 4: EXTERNAL RELATIONS

The policy of TEC is to strengthen the extension and outreach, the quality management for attracting and generating resources, and to develop internationalization in order to improve academic visibility and productivity. TEC has established some partnerships with other universities and institutions of the country and the region. For research purposes, several agreements (of MOU type) have been signed with universities abroad. TEC hopes to improve the level of the academic programs by the formation of teachers, and to settle its international position for research in some specific domains. Different administrative departments are concerned by this program: research and development, education, international affairs….

Field 1: Partnership policy

The different agreements concern teaching, research and technology transfer. Generally speaking, the policy of TEC involves national and international partners, academic/scientific and economic. Students as well as professors are much taken into consideration in the partnership. However, the lack of mobility of professors is an obstacle to the development of such an open policy.

Training and entrepreneurship, links with Alumni and the *Colegio* CITEC

TEC has an important number of students who have been graduated since the creation of the institute. So the Alumni network is very important and active. Noteworthy is the establishment of the CITEC, the *Colegio de Ingenieros Tecnólogos de Costa Rica*[29] which brings together TEC graduates. The committee points out the strong participation of this network/*Colegio* in the life of schools and research institutes. This network allows TEC to closely keep in touch and collaborate with the socio economic actors. Therein, TEC gets a better understanding of the changes in companies' expectations about future jobs and needed skills. Such an institutional view clearly facilitates the employment of graduates. TEC is a major entry point for international companies to hire engineers, as confirmed by socio economic actors during the on-site interviews. Regarding relations with the socio-economic sector, we note the care with which professional federations follow the training provided at TEC. They are involved in lessons and evaluation processes. Also, they consist of a constant source of proposals to carry out changes in educational content for a better training, but also to meet the expectations of employers needs in new jobs requiring different skills. Links with these federations allow TEC to have a better understanding of the evolution skills as needed from the socio-economic sectors so that the graduate students will be able to find a job more easily. Moreover, FUNDATEC is very important to increase the partnership with industries whereas TEC has an important role to develop the activities and exchanges in Costa Rica within the free trade zone. A special exchange and data processing platform between students and graduate students who are working is set up. It offers more facilities for communication (special events, grants, and training periods) but also new continuous training courses for employees. This could be further use to extend the field of internship.

Academic partnership

As mentioned above, TEC is engaged with several universities in Costa Rica and abroad trough MOU's. Several internal documents report on the academic partnership at national level and abroad[30,31].

Field 2: International relations

From an international point of view, the policy of TEC is to develop the internationalization of research and teaching. As mentioned above, TEC has signed several agreements with foreign universities or research institutes. Teachers are encouraged to prepare a PhD within these agreements which reveal the great importance of the relationship with the German academic sector (Max Planck Institute for plasma research for example). TEC also belongs to a consortium of central Latino America universities. In 2016, 270 foreign students were trained during at least one semester at TEC. Besides, a World Bank support allows TEC to send about 26 PhD students abroad. All these agreements, external supports and networks allow TEC to send students and teachers abroad. Despite this, the number of incoming students is low. The teaching courses in English are scarce. Moreover, English courses and level tests are not proposed to students willing to study abroad.

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[29] 35 años CITEC. Reconocimiento y Prestigio Profesional – Memoria Histórica 1981-2016 "*Del reconocimiento professional a la excelencia en la ingeniería*". Junio de 2016.

[30] TEC. Rapport activités 2016. Vice-rectorat Recherche et vulgarisation Febrero 2017

[31] Informe de convenios 2014 / Informe de convenios 2015 / 02. Informe de convenios 2016 / Propuesta de Agenda: Proyectos de Cooperación Poder Ejecutivo-Universidades Públicas en el Marco de Negociación del FEES 2015.

A special attention is given to the active and intense academic partnership with prestigious German institutes and universities[32,33]. The documentary evidence attests that TEC has an adequate international policy following the vision and values of the institution. Likely, the policy could be strengthened by (1) establishing a "*Foreign language plan*" at the institutional level; (2) further promoting the mobility of professors and researchers. We believe, indeed, that a pertinent international policy in any academic institution relies first on personal contacts build up during research stays (postdoc, visiting professors…) and scientific congresses/workshops. A particular effort of TEC to further support (1) the learning of foreign languages and (2) the mobility of researchers/professors will be, undoubtedly, of great added value. The current policy of the Vice-Rector in charge of Research and Development goes in that way. It should be implemented through establishing institutional tools such as a specific school for foreign languages and an international mobility platform. Likely, the scattered services involved in internationalization and mobility should best be brought together and unified into a clear administration for foreign affairs.

As an example, we highlight bilateral collaborative research projects between TEC and several institutions from Germany. Many of these collaborations have produced common publications in national and international journals. Several German institutions are concerned; various scientific domains are covered in engineering, material sciences, biotechnology, medical sciences, agriculture, environment and life sciences.

TEC also offers educational programs with international partners or with socio-economics sectors. The committee estimates that it is very important for TEC to develop these exchanges for the benefit of research and teaching.

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[32]   TEC - *Vice Presidency for Research and Outreach*. Research collaboration between Tecnológico de Costa Rica and Germany. 2016
[33]   TEC - *Vice Presidency for Research and Outreach*. Current bilateral collaboration Instituto Tecnológico de Costa Rica – Germany. 2016.

AREA 5: MANAGEMENT

Field 1: The institution's finances

The 2016 budget of TEC was 87 866 272.25 thousand *colones* (136 578 k€). The budget relies at 90% on the State grant (FEES) and on a specific fund created by CONARE to support its projects. In addition, TEC managed to obtain a World Bank loan of $ 50 million to finance infrastructures, and a human resource development policy related to research. FUNDATEC finances training activities, and continuing training up to $ 4 million. This amount is not reflected in the TEC's budget. The evolution of the State allocation is mainly based on the forecast of inflation for the following year. In recent years, TEC has benefited from a mechanical increase of its resources (8 to 10% per year), leading to create a very large financial surplus (its surplus has risen from 5 005 k€ in 2013 to 22 685 k€ in 2016). However, this positive financial situation carries two risks. The first one is the weight of the wage bill. The wage bill corresponds to 90% of expenditure, which blocks the budgetary structure. A policy to control costs related to payroll has been decided. With the foreseeable increase of the budget, it should make it possible to reduce its relative weight to 86% of the budget. The second, more structural, risk corresponds to the dependence on State financing. To reduce the share of public funding, a policy of diversification of resources has been included in the strategic plan. This policy of resource diversification must also be based on a more prospective approach to financial issues. TEC has not yet set up multi-annual financial projection tools. These very sophisticated tools could be developed at the national level in conjunction with CONARE. TEC also lacks a system of allocation of resources (financial and HR) based on the analysis of the use of funds. TEC demonstrates a constant concern for its positive impact on Costa Rican society. This societal concern could support a budgetary approach based also on performance analysis. Each TEC structure should be able to account for the use of public funds not only according to the requirements of internal control but also of the results of the actions carried out.

On the same trend, a collective reflection will have to be carried out to accompany a more fluid approach to financial and human resources. The positive situation of the past few years has allowed the TEC community to consider the means only upwards in the context of an annual dialogue largely based on the increase of students. In order to support its choices, the TEC authorities must now be able to rely on a policy of allocating resources in line with cyclical developments, in other words, to use the budget as a tool to implement its institutional policy.

Moreover, the prospective and strategic dimension of the questions of means must be supported by a macroscopic vision of the budget divided by actions. The committee was unable to obtain a breakdown of the budget between research, training and other expenditures during the on-site visit. The management of the institution has a very clear and very economic vision of the actions on which it supports its policy (financing of PhDs abroad or new infrastructures). Yet it still lacks a global and forward-looking budget that would enable TEC to compare with other international universities, and to set, where appropriate, multi-annual targets for the rebalancing of expenditure.

Field 2: The institution's human resources

TEC has 1 600 staff members: 800 academics and 800 administrative and technical staff. From a global and quantitative point of view, TEC must only control the share of its wage bill in its budget. It would also be advisable to have a vision that would articulate the performances of the structures and their human resources to vary upwards or downwards the number of staff allocated. The mapping work carried out by the Human Resources Department currently forms the basis of these prospective reflections.

Today, TEC has made teachers training and capacity building its priority. A genuine training policy has been set up to accompany the academic body towards the requirements of a *Research University*. The most significant measure is highlighted by the funding through the World Bank loan of a PhD program abroad for teachers (26 scholarships per $ 1 million in non-Spanish speaking countries to develop foreign languages and partnerships). This institution's quality policy based on a scientific international standard could be constraint by the lack of control over recruitments by the Rector Council or in a more collegiate manner by the scientific board. Academics are recruited directly by the schools without the university management being able to impose standards (the PhD is not compulsory!). The bodies of TEC must imperatively evolve its standards to be able at the same time to leave to the schools their autonomy of recruitment but imposing them strict

standards of high academic quality. We are ready to advance more detailed propositions in term of procedures to recruit academic staff.

TEC has set up a very high standard and demanding teacher evaluation policy with a system of points and tutorials. The same requirement for scientific activity should therefore be accepted by the academic staff.

On working conditions, TEC brings visibility to issues of safety, hygiene and discrimination. On security, a dedicated structure was created in 2016 to unify the work of several services. It should be noted that on all the buildings visited by the mission, a very precise and clear signage is visible in connection with volcanic risks. In the same way, a "health" commission ensures the follow-up of the agents. Finally, the issue of discrimination is also dealt with by the institution with the existence of a gender office. A few days before the arrival of the delegation, a festival linked to gender issues was organized with the stated will to evolve the mentalities inside and outside the campuses.

Field 3: IT system

From the point of view of information systems and IT infrastructures, TEC relies on an IT department which allows it to have the data necessary to monitor its activity and provide the expected IT services. A project to merge the IT department with the EDP service is a real opportunity. This merger should enable synergies to develop or acquire the collaborative tools closest to the needs of teachers and students. These tools should also make it possible to modernize pedagogical practices and adapt them to the transport constraints of Costa Rica and to the rationalization of the TEC training offer. TEC has 5 sites. The development of online courses and videoconferencing would make it possible to offer identical courses and homogeneous level of instruction whatever the region and site.

These issues have been recently addressed by the Institutional Council through the formation of the Information Technology Strategic Committee. TEC thus makes the digital issue a priority at the highest level (Rector and Institutional council). A global work must be further undertaken. First, it must make it possible to measure the means put at the service of these questions today. It must then establish the priority projects and propose a breakdown of the necessary resources. Thus, the need for infrastructures for research activities must also be analyzed in a prospective way as regard to the tools necessary for calculations and big data.

Finally, on this sector of activity, a measure of the results (and in particular of the actual use of the tools) must be developed by continuing the work related to administrative simplification through dematerialization.

Field 4: Real estate owned by the institution

TEC owns 908 hectares divided into 4 main provinces. The TEC's real estate management policy is characterized by growth. The World Bank loan is widely mobilized to finance the development of infrastructure for instance in the main campus (new library, new student residence, new training building). The loan from the international authorities demonstrates the ability of TEC's leadership and departments, to produce a credible asset strategy. TEC's patrimonial policy also reflects its desire to play a societal role. TEC has acquired two historic residences in the city centers of Cartago and San José. These two acquisitions are intended to preserve this rare national architectural heritage but also to have a high-quality academic and artistic activity in the heart of the city.

The main characteristic of TEC's patrimonial policy is the development of new sites. This territorial policy is at the national level. TEC meets the needs of the country and specially of developing regions. A comprehensive state-wide study should establish the actual impact of these sites on their environment and on the TEC's means of development. The study should establish the benefits and costs of this policy. The alternative could be the development of students' facilities (especially dorms or flats) for students from distant provinces (and foreign countries too). The new facilities could reduce the dispersion of the academic forces which is often detrimental to the development of the research.

This study refers to the TEC's ability to objectify its patrimonial policy on a multi-annual basis. On the issue of the multi-year vision of the costs associated with these new infrastructures, TEC seems to be counting on the continuing increase of its resources (including a $ 10 million loan currently being discussed with a Costa Rican bank) and a sustainable development policy. The development of solar energy and other environmental measures should make it possible to cover these new expenses. However, there are no figures to guarantee this. It is essential for TEC to have predictive measurement tools for infrastructure costs. This complex technical project could once again be brought to the level of the 5 public universities.

AREA 6: QUALITY AND ETHICS

Field 1: Quality and continuous improvement policy

TEC benefits from a quality policy supported by the Rector through the Institutional Planning Department (OPI). This service supports the whole community both in the very specific definition of institutional objectives and in the monitoring of the implementation of these objectives. It is also this service that produces all the data allowing the monitoring of the activity of the institution. The ongoing institutional accreditation process is part of a long tradition of external accreditation of training. Since 1999, TEC has been implementing an international accreditation policy of its training offer. In 2016, 78% of the students are enrolled in accredited training courses, and TEC aims to accredit 100% of its training in the years to come. A generalized accreditation policy on a core activity demonstrates the institution's ability to share its choices and constraints with its community.

This undeniable strength of TEC faces two challenges. The first challenge depends on the TEC community. An internal debate could be launched to distinguish the strategy of the institution (which must meet very few objectives) from the continuous improvement process that is included in the 2017-2021 strategic plan. The strategy may not directly benefit to all sectors or populations of the institution. Yet in the long term, the choices beneficial to the institution will benefit to everyone. The economic and development model of a university rests on this logic of choice and then redistribution. Redistribution, however, imposes the initial choices. On the other hand, the 17 "general policies" and 13 strategic projects correspond exactly to an overall policy of continuous improvement which must cover all the sectors of activity of the institution.

The second challenge for TEC is linked to a global and strategical view of its activities expresses by indicators. A document, "*indicadores de la gestion institucional*" shows the ability of TEC administration and leadership to produce meaningful indicators that emphasize the positive implementation of strategic choices. In line with its values linked to the beneficial role of TEC for its country, each actor must be able to know the effects of its activity. This vision can only be established by crossing data from different activities and it must have an upward or downward impact on the means allocated to it by the community. The quality of OPI's productions and the large amount of data transmitted to the mission draw the basis of such an approach. An evolution of the system of governance towards less systematic control would make it possible to drive human resources towards technical work allowing to construct a more objectified and prospective vision of the strategy.

Field 2: Ethics and professional standards

The community of TEC benefits from a very exhaustive and much diffused system of values. It is regularly recalled in the institutional documentation. It has an impact at all levels of action: institutional to individual.

TEC has developed a tool to track plagiarism on its platform of online courses.

Individual failing with the value system and the various professional regulations are monitored and sometimes prosecuted and punished. On the issue of sexual and gender discrimination, in 2016, 159 cases were handled by the office in charge of these issues. From a disciplinary point of view, the Labor Relations Board, a joint body between agents and the administration, has dealt with 57 situations over the past 5 years, resulting in 23 sanctions. TEC does not seem to confuse academic autonomy with impunity.

Linked to the generational changing among the academic and administrative staff, TEC could appoint a mediator to deal with the various tensions that might arise in a more informal way.

IV. CONCLUSION

The creation of the Costa Rica Institute of Technology (TEC) took place in 1971, and was aimed to build capacity in science and technology. TEC was assigned to carry out academic duties in this area in order to support the moving of Costa Rica from a rural to a diversified and integrated economy involving added value through innovation. The domains cover fundamental and applied sciences in seven priorities: Water, Food, Culture, Energy, Housing, Industry, and Health. In 2017, teaching and research are developed at TEC in structural units corresponding to multidisciplinary and transdisciplinary strategic lines: 20 academic schools and 7 academic areas (including 10 research laboratories); 10 research centers reporting directly to the research council; services for academic support (about 836 equivalent full time including 11 PhD); 1 Foundation (FundaTEC) to manage research and continuous training, and pilot extension services. TEC offers 3 levels of academic programs (61% of the TEC total budget): (i) Undergraduate: 4-year Bachelor and 5-year Licentiate; (ii) Graduate: 2-year Master degree; (iii) Postgraduate program: PhD degree. TEC offers 22 undergraduate and 17 graduate programs among which 50 % are accredited by four agencies. A staff of 1650 full time human resources performs academic duties (education, research and extension service). Over the last 5 years, the number of students has increased by nearly 47%, mainly in bachelor and licentiate, reaching almost 12000 students nowadays. The institution is autonomous. Its organization is spread out in several councils and structures of education and research. The Organic Statute attributes responsibilities and roles to selected functions (e.a. Rector and Vice-Rectors), councils, and a number of groups making up the university community. The democratic approach relies on several bodies that promote participation in decision-making processes at different organizational levels.

The Institution is renowned: TEC radiates at both the national and regional levels, provides qualified graduates to serve the development of Costa Rica and countries from Central and Southern America. But nowadays, after 46 years of existence, TEC has undoubtedly reached a turning point. The step forward is clearly to build up a Research University. Further development of TEC indeed requires to strengthen research and to bring it to international standard levels. Achieving this goal is undoubtedly strategic for the future of TEC: strengthening research will indeed increase the attractiveness of TEC; improve the quality of training through a research based higher education approach; support innovation and technology transfer; strengthen the links with the private sector; contribute even more to the sustainable development of the country.

STRONG POINTS

— Very solid and unifying value system. Strategy, vision, missions, clear and strong humanistic values are widely shared between community members. The institutional strategy is embodied and prioritized. Academic authorities have a clear vision of the issues and appropriate plans for the future. The internal atmosphere looks excellent.

— Dynamic and Voluntary University. Voluntarism and determination of the authorities to make TEC a reference institution. A voluntarist policy is developed to move the institution forward. There is an Interactive dynamism between TEC and stakeholders.

— Branding. TEC enjoys a national and regional recognition. It radiates in Costa Rica, Central and Southern America.

— Adaptation of training to the needs of the country.

— Planning, quality and internal control all serve the operative functioning of TEC.

— Student life: rich and organized community life; social support; student representation and academic valorization of their commitment; tutoring; infrastructures.

WEAK POINTS

— Governance and organization. The statutory governance is heavy, and involves a huge number of structure and councils. The governance of TEC suffers from a.o.: (i) the excessive participation of a number of representatives, (ii) the lack of flexibility, (iii) the dilution of decisions, (iv) the slowness of decision-making processes, (v) the total lack of control of the rectoral authority on the academic recruitment, (vi) a weak participation of external stakeholders. The organization is micro-subdivided

and characterized by an exploding multiplicity of teaching and research structures, and a scattering of laboratories involving a dispersion of equipment and infrastructures.

— Research. The research is weak relatively to international standards. Research and training are unbalanced. Education is poorly research-based.

— Financial dependence. TEC financial support is strongly dependent on public investment.

— Under-positioned administration. The administration is remote from the stakes and strategy or dispersed among several authorities. There are few or no tools to characterize prospective.

— Foreign language learning policy. The institutional policy is weak in this domain.

RECOMMENDATIONS

We recommend to TEC to alleviate the weak points listed here above. We strongly recommend to adapt the governance and organization of TEC in order to make it more flexible and responsive, more efficient to face present issues and challenges.
Particularly, we point that further development of TEC requires in priority to strengthen research and to bring it to international standard levels. This is undoubtedly strategic for the future of TEC. It requires profound changes in terms of building up a research culture in TEC, especially:

— to adopt international standards in research performance, and participate in international calls for research proposals, networks and congresses/workshops;

— to further encourage academic staff and researchers to publish their results in international peer reviewed journals: judicious efforts have been made in this direction; they must be pursued and intensified;

— to hire academic staff at PhD level and give a leading role to the Rector Council in the process of academic recruitment; take account of scientific production in the academic career;

— to rationalize the structural organization of TEC to improve teaching and research performance, and further develop a research-based education framework in the line of the von Humboldt model;

— to link institutional strategy and governance wherein excessive participation in decision processes is presently an obstacle to TEC development to build up a Research University.

Implementing the 2017-2021 strategic plan of TEC is a mandatory step to initiate such a transition.
In addition, we recommend to the TEC authorities to carefully analyze our propositions here below and investigate them for possible implementation:

— Research and outreach: establishing a TECTTO (Technology Transfer Office) and a TECIN (Innovation Network) to build up a comprehensive ecosystem bringing together stakeholders, both internal and external, around the research and development issues optimizing outreach and valorization.

— Internationalization: establishing a "Foreign Language Plan", may be through a specific language school, and an international mobility platform.

V. COMMENTS OF THE INSTITUTION

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Tel.: 2550-2211 • Fax: 2551-9603

R-1010-2017

August 29, 2017

Mr.
François Pernot
Director of the European and International Department
HCERES

Dear Sir:

We wish to offer our most sincere gratitude to the evaluation team selected by HCERES for the high professionalism and detail with which our self-assessment report was reviewed and that it showed during the external evaluation visit carried out at our campus in Cartago last May. Your observations have become an important input for our university and will be seriously considered in our future actions.

We also thank HCERES for the opportunity granted the Costa Rica Institute of Technology (TEC) to participate as a pioneer institution in the process of bringing together the French higher education system to Costa Rican and Central American universities, towards the development of a regional institutional accreditation model. The experience of the evaluation of our university is a significant milestone in the process of improving the quality of higher education in our countries, in the capacities to increase impact and strengthen our scientific production, and in the internationalization of our work.

The institutional accreditation to which we aspire aims to consolidate the work that for 46 years TEC has been developing for the benefit of the Costa Rican society, particularly with the efforts that began in 1999 for the accreditation of academic programs with national, regional and foreign entities, offering these programs recognition for their quality and visibility worldwide.

At the beginning of these 46 years of life, our young university faced a period framed by a context of political instability in the Central American region and a severe financial crisis in the 1980's, which made it difficult for teachers to train at the postgraduate level and limited the comprehensive development of these programs in the country, as well as, the construction of research infrastructure. The context of 80's limited our work towards a focus on teaching and extension activities, emphasizing the formation of human talent for the transformation from an agricultural to an industrial and service economy. Thanks to this transformation in the last two decades, the country has been able to increase and diversify its economy, which has improved the financial stability for public universities. It has also allowed the country to advance on the path towards a knowledge-based society, stimulating awareness of TEC important role, and

proving the importance of strengthening the components of scientific and technological research.

Within this context, our Third Institutional Congress (2007) established a new Academic Model that defines the central role of research in academic activity. Currently, we can show HCERES and to the Costa Rican society that thanks to this turning point, our institution presents increasing trends in the amount of investment in research, of the number of active researchers, ongoing research projects, number of students participating in research, number of publications in indexed journals (SCOPUS / ISI), as well as in the number of people with doctorate degrees, without neglecting our teaching activity, which has experienced a significant growth in all of TEC's campuses. We know that these results are just a beginning of the process that leads us to a research university, but we also work with the administrative mechanisms to firmly continue in this direction from the Rectory, Vice-Rectory of Research and Extension, our research programs and regional campuses.

With regard to the report issued by the evaluation panel, in addition to reiterating our gratitude, we want to point out the following aspects:

1.   We are very satisfied with the strengths found by the panel. On these subjects we have had the same feedback from external entities (accreditation agencies, external auditors, businessmen, alumni, and others).

2.   We recognize and share findings that point to the weakness in the areas of research, doctoral training of teachers, institutional governance and command of a second language. These weak areas coincide with findings expressed by our stakeholders during the consultation processes for the formulation of the Strategic Plans 2013-2016 and 2017-2021.

3.   About the recommendations issued by the evaluating panel as the impulse for TECCTO, TECIN. We believe that the University-Industry Liaison Center under the Research and Extension Vice-Rectory and the Business Incubator (in transition to an Innovation Center) are relevant antecedents for hosting these two recommendations.

4.   We ratify the institutional commitment to the Strategic Plan 2017-2021, which allows us to work in the areas where the main challenges and weak points were found. The findings coincide with those obtained in our strategic prospective exercise, which makes us aware of the importance of improving in those challenged areas.

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We consider institutional accreditation before HCERES as the next step in the process of balanced development of our three substantive areas: Teaching, Research, and Extension. This accreditation will increase the awareness of our university community, strengthen TEC to generate research with world-class standards, strengthen all indicators of international institutional positioning. Hence, we expect with these changes to attract funds as well as improve the image of the country and the institution. Accreditation is an element that would make TEC more attractive for academic mobility, and for international scientific and academic collaboration.

Acknowledging the weaknesses in the areas of research, academic doctoral training of teachers, institutional governance, command of a second language, but also certain of our commitment to the development of the Strategic Plan 2017-2021, we request to the Council of HCERES the accreditation of our institution.

Likewise, and given the urgency of the universities in Costa Rica and Central America to improve their quality and academic performance, as well as their social relevance, we urge HCERES to continue with the actions that have been carried out in the framework of negotiations with CSUCA, SINAES and CONARE (with the active participation of the French Institute of Central America), in the construction of an institutional accreditation model at a national and regional level. Without a doubt, the experience of TEC as a pioneer institution in this process will surely bring lessons learned to all actors involved in this common interest.

Sincerely,

TEC | Tecnológico de Costa Rica
Rectoría

Julio César Calvo-Alvarado, Ph.D.
Rector
Costa Rica Institute of Technology

JC-sc

c. File

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