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Global trends marking the development of Ecuador's higher education: relevance, regionalization and expansion of the academic market

Tendencias globales que marcan el desarrollo de la educación superior en el Ecuador: pertinencia, regionalización y expansión de la oferta académica

José A. Flores
FLACSO-Ecuador
pepejos66@gmail.com
Orcid Code: https://orcid.org/0000-0002-3640-9129

Endel D. Pernía
UNEARTE-Caracas
endelperniaecuador@gmail.com
Orcid Code: https://orcid.org/0000-0002-0238-4584

Abstract
Ecuador has achieved great progress in terms of quality, inclusion and relevance of Higher Education. However, the higher education system still shows deep gaps which reproduce the structural characteristics of the economic and demographic asymmetry of the country. This study explores the conception of education as a human right and public assets. From this perspective, the study explores the challenges that the higher education system faces. The analysis starts from the data presented by the entities in charge of higher education, and subjects it to a critical reading while presenting ways to regionalize the impacts of the higher education institutions in Ecuador. The data is contrasted with the different social, legal, planning, and development the Ecuadorian framework as well as the international framework (UNESCO and the UN documents among others).

Keywords
Higher Education, Ecuador, gaps, regionalism, public assets, human right.

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Resumen
Ecuador ha logrado grandes avances en relación a la calidad, la inclusión y la pertinencia de la educación superior, sin embargo, el sistema de educación superior aún conserva profundas brechas que reproducen las características estructurales de la asimetría económica y poblacional del país. El presente estudio explora la concepción de la educación como "derecho humano" y "bien público", y desde esa perspectiva explora los retos que el sistema de educación superior debe enfrentar. El análisis parte de los datos presentados por los organismos rectores del nivel de educación en mención, para someterlos a una lectura crítica y presentar formas de regionalizar los impactos de las instituciones de educación superior. Los datos son contrastados con los principales discursos presentes en los diversos marcos sociales del Ecuador (legal, planificación y desarrollo) y del contexto internacional (documentos de la UNESCO, la ONU, entre otros).

Palabras clave
Educación superior, Ecuador, brechas, regionalización, bien público, derecho humano.

Introduction

Since 2008, the Government of Ecuador initiated the rescue of higher education as a "human right" and "public good", emphasizing in its discourse the democratization of access and quality as ways to implement the new model of development and to reach the social pact embodied in the Constitution of 2008. There are several models for the regional development of higher education which will be explored in this document, for their discussion to continue the construction of a model that adapts to the needs and characteristics of Ecuador, and to allow the right to higher education to be exercised with criteria of potential supply expansion, quality, inclusion and relevance.

The country has made important advances in relation to the quality, inclusion and relevance of higher education, but the higher education system still conserves deep gaps that replicate the structural characteristics of economic asymmetry and population of the country. In this sense, the greater coverage in relation to the access and location of universities, polytechnic schools and higher institutes is found in the most populated centers, but there are great challenges in terms of internal mobility of students, teachers and

researchers; despite the significant increase in enrolment, a large number of the population who do not have access to higher education persists.

In this scenario, the main problem that this article explores is the most appropriate ways to regionalize higher education as "human right" and "public good". To solve this, an analysis of the international context will be presented in relation to the gross enrolment rate of the countries of America and Europe, moving to the localization of the most important speeches that the Ecuadorian norms of higher education have introduced for its configuration, to finally locate the social analysis of the Ecuadorian context.

The international context of higher education in America and Europe

In the Global Compendium of Education (UNESCO, 2012) it can be observed that in America, the countries with the highest gross enrolment rate are: Cuba (95%), USA (95%), Argentina (71%) and Uruguay (63%). Whereas in Europe are Finland (94%), Denmark (74%), Sweden (74%) and Spain (73%). Within these countries, the relationship between public and private sphere in the offer of higher education is as follows:

Table 1
offer of public and private higher education

Country	Academic offer in public institutions	Academic offer in subsidized institutions	Academic offer in private institutions
Cuba	100%	0%	0%
EE.UU.	72.5%	0%	27.5%
Argentina	72.7%	5.5%	21.9%
Uruguay	87%	0%	13%
Denmmark	98.3%	1.6%	0.1%
Finland	81.2%	18.8%	0%
Spain	69%	27.9%	3.2%
Sweden	93.4%	6.6%	0%

Source: UNESCO, 2012

To achieve the highest number of enrolments, some countries use the territorial expansion of their higher education systems, but with different strategies. United Stated, Cuba, Argentina and Spain are committed to "intensive territorialization". Thus, in the United States it is tried to cover almost all the counties of the country, in Cuba all the municipalities, in Argentina all the provinces and communes, and in Spain all the territories with populations higher than 50 000 inhabitants[1]. On the other hand, the cases of Denmark, Finland, Sweden and Uruguay, although they also have an important territorial coverage of the offer in higher education, have a marked feature of internal "student mobility", where students move from their place of origin to the study centers, normally located outside their locality (Arnesen and Lundahl, 2006; Fägerlind and Strömqvist, 2004; Andersen, 2017).[2]

It should be mentioned that in the case of Denmark, Finland and Sweden the higher education system has as a fundamental trait, a well-developed student welfare system for comprehensive care that includes, among other things, the granting of scholarships for all students of higher education, the possibility of accessing subsidized housing intended for students only and access to credits for educational purposes at a minimum interest rate.

Therefore, beyond the expansion strategy, high tuition coverage has a direct correlation with the public provision of higher education offerings. Models of increase in enrolment can be based on intensive territorialization —as in the case of the countries exposed in the first place— or an intensive mobility towards university development poles —as in the case of the countries exposed in second place—.

Two basic models were identified in each country in relation to the internal mobility of students, teachers and researchers. On the one hand, systems with a high integration level to allow internal mobility, such as the European system produced by the Bologna Process and the creation of the European Higher Education Area that favors student exchanges

1 For more information on the intensive territorial expansion in these countries the following pages can be consulted by country: USA (https://goo.gl/Tx5xXQ), Cuba (https://goo.gl/fdCet1), Argentina (https://bit.ly/2MRNyiW) and Spain (https://goo.gl/1spf6N).

2 For more information on the territorial expansion by mobility in these countries, the following pages can be consulted by country: Denmark (https://goo.gl/GW52LT) (https://goo.gl/FZR9De), Finland (https://goo.gl/ZgT7zV), Sweden (https://goo.gl/ebhwc1) and (https://goo.gl/jRWtqT) and Uruguay (https://goo.gl/TxzKhV).

at the internal and external levels of the member countries, through the development of a common structure of qualifications and mechanisms for the accreditation of knowledge (Pereyra, 2006). On the other hand, higher education systems with a low integration level were identified to allow student, teacher and researcher mobility, where students are difficult to change from one university to another or a semester in a different university in its own country or region; although important efforts have been made in Latin America for the systemic integration of higher education, the results are still below the needs (Aupetit 2006).

Normative framework of the Ecuadorian higher education and its prospects of development

At the international level, to raise the regional development of the higher education system in Ecuador is directly related to four of the 17 objectives of sustainable development, promulgated by the UN General Assembly (2015) —and indirectly with all others— which are:

- Objective 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.
- Objective 8. To promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.
- Objective 10. Reducing inequalities: to reduce inequalities between and within countries.
- Objective 12. To guarantee sustainable consumption and production modalities.

At the national level, the regional development of the system has its legal basis in the Constitution of the Republic of Ecuador, in art. 3, which mentions the duty of the State to guarantee the right to education and to promote the balanced development of the nation; education is defined as a right, establishing the parameters for its fulfillment[3]. On the other hand, in title VII of the Good Living, various fundamental elements of education are established as a right[4]. Likewise, in relation to the organic Law of Higher

3 Articles 26, 27, 28 and 29.
4 Articles 343, 350, 351 and 352.

Education (LOES), [5] the aims of higher education and the rights of the "educational community" within the system are defined, among which one can be clearly observed the generation of knowledge for the well-being, and the development of the nation, as well as the guarantee to study and research. Art. 107 defines the relevance principle of higher education and reflects the importance that it should contain in order to develop training processes that meet the expectations and needs of society and territory.

In relation to the national Plan of Good Living (2013-2017), regional development of the higher education system is directly related to five of the national objectives —and indirectly with the remaining seven—:

- Objective 2. To sponsor equality, cohesion, inclusion and social and territorial equity, in diversity.
- Objective 8. To consolidate the social and solidarity economic system in a sustainable way.
- Objective 10. To promote the transformation of the productive matrix.
- Objective 11. To ensure the sovereignty and efficiency of the strategic sectors for industrial and technological transformation.
- Objective 12. To guarantee sovereignty and peace, to deepen the strategic insertion in the world and the Latin American integration.

These objectives are complemented by the current state planning (National Development Plan 2017-2021). In this way, since the social transformation is articulated as a long-term process, in this text the objectives raised in the last decade are considered, where the strategic planning returns to the state. In the last proposal —in line with planning 2013-2017— is raised:

- Objective 1. To guarantee a dignified life with equal opportunities for all people.
- Objective 5. To boost productivity and competitiveness for sustainable economic growth in a redistributive and solidarity way.
- Objective 6. To develop the productive and environmental capacities to achieve food sovereignty and good rural living.

5 Articles: 3, 4, 5, 6, 7 and 9.

- Objective 7. To encourage a participatory society with a state close to the service of citizenship.

In the period in which this analysis is focused, Ecuador underwent a process of normative reforms that connected it internationally. In this way, it incorporated into the national planning development concepts that bet on the centrality of the educational processes to promote integral structural changes. It was opted for the fairness of wealth distribution processes as a condition for the expansion of the quality educational offer. In this sense, it broke with the prejudice of the education democratization without quality, because —as seen in international systems— to broaden education coverage with relevance criteria on the context of a disputed concept such as good living implies improving poverty levels and promoting equitable progress in the territories.

Territorial inequality, supply and relevance of the Ecuadorian higher education

Ecuador has a territorial and economic asymmetry, fomented by the relationship of two regional poles of economic and political power called Sierra-Costa (Quito-Guayaquil), where the main populated centers, basic services and social wealth generating companies are agglutinated (SENPLADES, 2009). This phenomenon is also reproduced in the offer distribution of higher education. In this regard, "an inequitable distribution of education generates a negative impact on *per capita* income in most countries" (Muñoz, 2004, p. 28). To help break the economic asymmetry, the asymmetry of the university educational offer must be eliminated: the current regional distribution of the studying possibilities is a hindrance to the potential of economic development of Ecuador (cf. Bourdieu, 1981) and its ability to insert into the knowledge economy.

On this subject, the state planning carried out in the year 2013 mentioned that "sponsoring equality and eradicating poverty requires eliminating the territorial gaps through the promotion of rural development and promoting a polycentric national structure, which permits the urban-rural equilibrium" (SENPLADES, 2013, p. 120).

In this context, the need to deepen the regional development of higher education is given in at least two fundamental factors. The first is the difficulties that an important part of the population has to move to the cities where the institutions of higher education are located. In this way, as there is no offer in their region, the possibility of accessing third-level education is limited. The second factor has to do with local and regional development, where the academic offer should be related to the potentialities and needs of the territory (Díaz, 2000). A vision such as the one raised would allow carrying out research, generating enclaves and productive cluster, solving problems at the level of both the nearest communities and the region in general. It would be a relevant academic offer that relates to the surrounding production sector, enhancing its capacities and scaling up national production. On this, can be mentioned that:

Interdependence relations, together with asymmetric power relations between the countryside and the city, have helped to organize the social and productive dynamics of the territories, including the structuring of inequality gaps, often rooted in patterns of racial discrimination and social dynamics that have provoked strong pressures on natural resources. This evidences serious conflicts of use and sustainable exploitation of local potential. In this context, it is necessary to consolidate the specialization of the various human settlements present in the national territorial system, based on the host capacity of the territories (SENPLADES, 2013, p. 121).

It is also worth mentioning the notion of "relevance" that the LOES presents:

The relevance principle consists that higher education responds to the expectations and needs of society, to national planning, and to the development regime, to the prospective of global, scientific, humanistic and technological development, and to the cultural diversity. To this end, institutions of higher education will articulate their teaching, research and outreach activities with society to academic demand, to the needs of local, regional and national development, to the innovation and diversification of professions and academic degrees, to the tendencies of the local, regional and national occupational market, to the local demographic tendencies, provincial and regional; to the linkage with the current and potential productive structure of the province and the region, and to the national policies of science and technology (LOES, 2010).

The regional development of the higher education system is a fundamental piece in order to consolidate this important human right against the problems related to access to higher education (Cedeño and Machado, 2012). However, it is necessary to think critically about one of the most emblematic issues in territorialization: how to achieve it without detriment to the quality of education? In this sense, quality education is one of the main democratization elements of rights, as a first step towards building a more productive society: "the assumption for such a bet is that a quality education for all is the main means of building a radical democracy of quality, and it is an effective mechanism to transform the primary productive matrix-exporting and secondary-importing" (Ramírez, 2016, p. 6).

The regionalization of the educational offer should take into account the expansion criteria of education as a public good (even if it is administered by a particular institution) and the relevance of knowledge to the community, the productive sectors and the natural potentials of Ecuador.

The right to education from the territories, from relevance, means in today's world to claim the need for the right to alternative knowledge, to be created by a new "epistemology from the South" (De Sousa, 2010). If this structure is not broken, it will be more difficult to achieve the cognitive democracy of the population, the change of the productive matrix, the achievement of the objectives embodied in the constitution and the integral development of Ecuador.

Boaventura de Sousa (2010) proposes that the public good of the university happens to be produced in cooperation, i.e to join the resources, to look for the synergies and to enhance the performance of the system. Thus, the construction of this public cooperation will involve sharing resources and equipment, the mobility of teachers and students, and a minimum standardization of plans and careers, organization of the school year and evaluation systems. None of this should eliminate the specificities in which each institution of higher education aims to respond to the local or regional context in which is inserted. On the contrary, this specificity, when maintained, can be valued much more within the network.

For the production of this cooperation, must be developed the regional system of higher education, promote its interaction, its mobility, its synergy for solution search and transformation of the existing reality into a reality

built by the greatest amount of possible actors, from the intersubjectivities, the development potentialities to achieve the construction of Good Living.

Advances and challenges in the regionalization of the Ecuadorian higher education system

In the last decade, Ecuador went through a reorganization process and quality increase of its institutions of higher education. The so-called "mandate 14" of the constituent process brought with it the evaluation of all the institutions, resulting in the closure due to lack of quality of 14 universities, 40 extensions and 125 technical institutions (Ramírez, 2016). Likewise, the tendency of the system was reversed, the institutional models of knowledge, learning and academic organization were transformed for the creation of learning and research environments that lead this country to the knowledge society, particularly through the generation of bioknowledge (De Sousa, 2010; Ramírez, 2016).

In the period 2006-2014, in absolute terms, enrollment has grown by 136 000 students. In this sense, the enrolment of the two poorest quintiles has doubled from 33% to 67%. Today, one in two Ecuadorians who accesses higher education comes from families where neither the father nor the mother attended this educational level (approximately one hundred thousand students) (Ramírez, 2016). In this sense, the gross university enrolment rate has grown and has gone from 28.8% in 2006 to 33.3% in 2014. This growth is reflected more to the detail between rural and urban areas, from 38% to 42.1% in the cities and from 10.9% to 14% in the peripheries between 2006 and 2014 (INEC, 2016).

Nevertheless, the progress of the higher education system in recent years, and the structural conditions around the regional imbalance of the enrolment have not been able to transform in its entirety, since this is the product of the imbalance structure condition of the Ecuadorian territorial development and the historical tension that has favored, in terms of services, the economic, political and more populated centers of the country to the detriment of the furthest regions.

In this sense, the imbalance in the gross enrolment rate by province can be observed:

Table 2
Gross tuition rate per province (2014)

Provinces	Gross rate
Morona Santiago	10.2%
Sucumbíos	12.2%
Napo	14.3%
Orellana	14.5%
Zamora Chinchipe	15.5%
Pastaza	18%
Carchi	20.3%
Santa Elena	21%
Cotopaxi	22.6%
Los Ríos	22.7%
Santo Domingo de los Tsáchilas	23%
Esmeraldas	23.7%
Cañar	24.8%
El Oro	27.1%
Chimborazo	29.7%
Manabí	30%
Guayas	34.5%
Imbabura	34.7%
Tungurahua	34.7%
Azuay	34.9%
Bolívar	36.7%
Loja	44.1%
Pichincha	49.1%

Source: INEC, 2016

The provinces with the lowest gross enrolment in higher education are Napo (14.3%), Morona Santiago (10.2%) and Sucumbíos (12.2%). The provinces that are above the national average are Pichincha (49.1%), Loja (44.1%), Bolívar (36.7%), Imbabura (34.7%), Azuay (34.9%), Tungurahua (34.7%) and Guayas (34.5%). In this sense, in seven provinces the institutions of higher education (IES) do not have offer fourth level formation (postgraduate): El Oro, Zamora Chinchipe, Morona Santiago, Orellana, Napo, Sucumbíos and Carchi.

The training that has the greatest territorial occupation is the superior technical and technological, as can be corroborated in the following table 3: [6]

Table 3
IES by province

Province	University or Polytechnic	Technical Institution
Orellana	0	1
Sucumbíos	0	2
Morona Santiago	0	4
Santo Domingo de los Tsáchilas	0	6
Zamora Chinchipe	0	7
Santa Elena	1	0
Galápagos	1	0
Pastaza	1	3
Napo	1	4
Carchi	1	5
Esmeraldas	1	5
Bolívar	1	7
Cañar	1	10
Cotopaxi	1	10
El Oro	1	10
Los Ríos	2	6
Loja	2	17
Chimborazo	2	23
Imbabura	3	12
Tungurahua	3	21
Azuay	4	9
Manabí	5	8
Guayas	13	38
Pichincha	16	78

Source: SNIESE, 2016

6 To expand this information consult: https://goo.gl/zB4wfg/

Considering the latter, the relationship between the number of IES per province and the gross enrolment rate is as follows:

Table 4
Gross enrolment rate and total IES by province

Province	Gross rate	Total IES
Morona Santiago	10.2%	4
Sucumbíos	12.2%	2
Napo	14.3%	5
Orellana	14.5%	1
Zamora Chinchipe	15.5%	7
Pastaza	18%	4
Carchi	20.3%	6
Santa Elena	21%	1
Cotopaxi	22.6%	11
Los Ríos	22.7%	8
Santo Domingo de los Tsáchilas	23%	6
Esmeraldas	23.7%	6
Cañar	24.8%	11
El Oro	27.1%	11
Chimborazo	29.7%	25
Manabí	30%	13
Guayas	34.5%	51
Imbabura	34.7%	15
Tungurahua	34.7%	24
Azuay	34.9%	13
Bolívar	36.7%	8
Loja	44.1%	17
Pichincha	49.1%	94

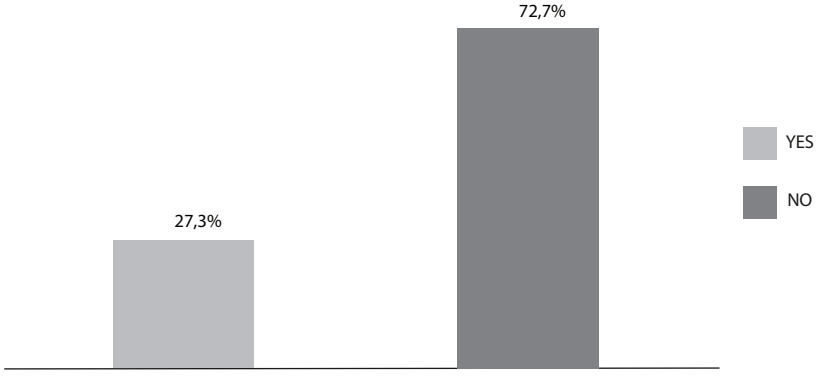
Source: own elaboration

It should be noted that the highest gross enrolment rate corresponds to a high number of IES per province. The gap in the number of institutions from one province to another is a sign of the historically uneven development of the Ecuadorian higher education system.

To start to correct the structural imbalance of this system, three of the four newly created universities are located in the interior of the country: Universidad Nacional de Educación (UNAE) in Cañar, Universidad Regional Amazónica Ikiam in Napo and Universidad de Investigación en Tecnología Experimental Yachay in Imbabura.

Considering the small territorial dimensions of the country compared to others in the region, and part of the correction of these imbalances, it has opted for an interregional academic mobility model, which allows students to be assigned to university centers away from the community of origin and the development of a scholarships system and attention to the university community so that students can go to the universities (Ramírez, 2016). However, according to the national leveling and admission system, by March 2015, the total number of participants in the exams, the percentage that accepted quota outside its province was 27.3%, while those that did not accept was 73.7%, which can be considered as an indicator of the volume of new income mobility in the system (SNNA, 2015).

Figure 1
Percentage of applicants who accept quota that were mobilized according to their province of residence and campus province (March 2015)



Source: SNNA, 2015

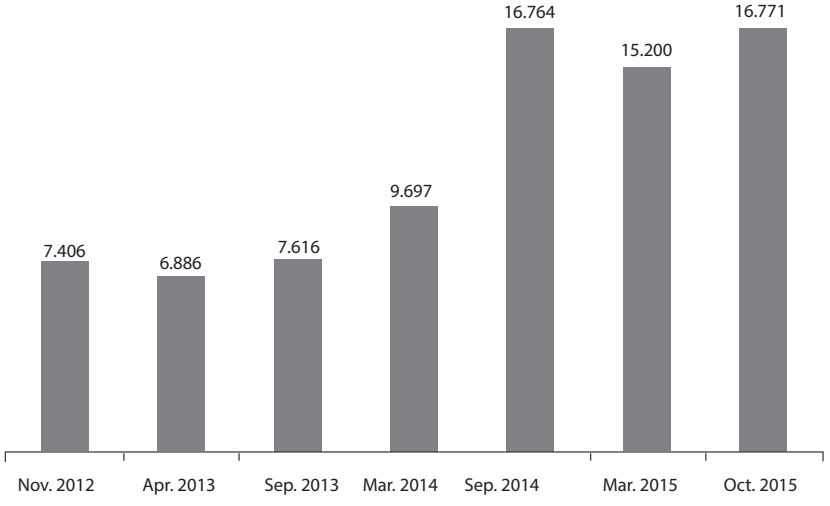
In relation to mobility, it should be mentioned that by opting for such an alternative as a formula for inclusive development of the higher education system, the relevance of the careers studied in relation to the development of the origin community of the student should also be considered, as well as the difficulties that arise for their return once graduated.

Since the formulation of the LOES, the projects of new careers must contain the component of relevance and linkage with the society, so that the Council of Higher Education (CES) can consider its approval, which motivated that all the careers created from 2010 until today consider their contribution to the development of the country.

Among other measures, four premises were set to advance towards the proliferation of relevant careers: services to achieve good living, careers with less saturated or non-existent demands, articulation with the productive structure (strategic sectors, basic industries, public companies, frontier Sciences) and territorial relevance. 67 relevant careers were established at universities, most of them concentrated in engineering, industry and construction, natural sciences, mathematics and statistics. Although the expected results of these careers depend on a long-term process, the national supply of relevant careers has increased by 14% in recent years. Nevertheless, in the efforts for academic relevance, it should be mentioned that more than 90% of the careers offered in technical and technological institutes —especially in the private area— correspond to commercial education (Samaniego, 2016).

On public technical and technological education, it must be said that an effort has been made to revalue it in the official discourse and in the redesign of its academic offer, so that it has social and productive relevance. For 2017, 48 new dual-modal technical and technological careers were created, focused on industry and production, and the number of quotas available for these formations at the national level increased from 7 406 in 2012 to 16 771 in 2015 (SENESCYT, 2015).

Figure 2
Academic offer: Real quotas and total acceptance (2012-2015)



Source: SNNA, 2015

Another important aspect of the regional system development is the multicultural[7] relevance and its ability to absorb historically marginalized groups in the territories. On this, in 2015 the Ministry of Higher Education, Science, Technology and Innovation (SENESCYT) issued a ministerial decree where it makes binding that public universities reserve 10% and private universities 5% of their tuition for historically excluded populations (indigenous, afro, montubios, disabled citizens and people deprived of liberty, among others). In turn, private universities must provide at least 5% of their scholarships or financial aid to students excluded for social reasons. In addition, a guideline where all the subjects have to be rethought from an intercultural perspective and all the students, before graduating, must practice attending social problems in rural and urban marginal places

7 The concept "multicultural" and non-intercultural is used. The multicultural refers to the recognition of the "other", while interculturality refers to the conditions of such recognition. Ecuador has taken important steps to democratize access. The intercultural system remains a challenge in the epistemological and material level in Ecuador.

(Ramírez, 2016). However, the challenges in intercultural matters are still superior to the capacities developed in the system for their approach.

There are no daily synergies for conducting joint research processes between universities or higher institutes, student exchanges, the possibility of pursuing studies without losing the credits obtained in another institution and structures to facilitate the transit of a student from higher technical institutions to tertiary education institutions (the latter is the result of the debugging process of the system to ensure the academic quality of the universities).

The higher education system, at the regional level, still has limitations on equitable access for all populations and on the mobility of teachers, researchers and students.

Despite this, important steps have been made to promote the internal and external mobility of teachers, researchers and students as a system development element. At the moment, Ecuador has a remarkable advance in legal terms to promote mobility, the most relevant instrument in this regard is the regulation of academic regime of the national system of higher education, dictated by the CES in 2013, which states: "to promote the national and international mobility of professors, researchers, professionals and students with a view to integrating the Ecuadorian academic community into the dynamics of knowledge at the regional and global levels" (CES, 2013, art. 2-E). In addition, it orders that the academic period of the institutions must, obligatorily, develop two regular periods per year, with a minimum of 16 effective weeks "for the purpose of facilitating academic mobility in the higher education system" (CES, 2013, art. 13). Specifically, in relation to the internal mobility of the students it is established that the hours of an approved course or subjects:

Will be susceptible to transfer between subjects and programs of one or different training level, in the same or different IES, in accordance with this regulation. CES will be able to oversee this process and promote academic mobility at the regional, national and international levels (CES, 2013, art. 63).

In the same aspect, but with regard to the professors, it is mentioned that:

In order to ensure the mobility of academic staff, public higher education institutions may grant licenses or commissions of service, as well as carry out position transfers and sign agreements with other institutions of higher education, national or international (CES, 2013, art. 84).

Finally, it is instructed that "the public IES may authorize the position transfer of their academic staff, with or without the corresponding budget, from one IES to another, duly legalized" (CES, 2013, art. 85).

In the interest of the system development and the academic integration, on May 14, 2012, in Quito, representatives of the category A Universities met and constituted the Ecuadorian Network of Universities and Polytechnic Schools for Research and Postgraduate Studies, whose objective is to act for the integration of scientific and academic development, based on reflective practice, innovation and collaborative work, promoting debate and the generation of solutions to the problems of society, by linking between the academy, the company, the community and the state[8]. In this context, the networks developed in this institutional framework, up to 2017, are: robotics, telecommunication, chemical engineering, biotechnology, dairy derivatives, education sciences, language and literature, tourism and hospitality, energy, management of the territory and technology of geospatial information, economics and administration, materials and nanotechnology, mechanics, bioproducts, computer Science and information, earth sciences and environment, law, chemistry, biological sciences, hydrogens and fuel cells, art-design and architecture. A strong challenge for this network is to develop its integrality to integrate several actors, so that all institutions of higher education —as in the case of higher institutes— can participate and benefit from the work of the network.

SENESCYT accompanies most of the aforementioned academic networks. The networks with the most institutional participation are the administration (50 IES), informatics (30 IES), economy (26 IES) and languages (24 IES). In addition, it should be mentioned that there are smaller networks, recently constituted, but of great importance for the national development such as: mechatronics, forestry, tourism, psychology, veterinary and animal science, initial education, basic education, dentistry, pedagogy of mathematics, aquaculture and pedagogy of history (SENESCYT, 2015).

These networks have already important advances in the harmonization of qualifications (informatics), redesign of the curricula (languages, tourism, aquaculture, automotive engineering, veterinary and animal sciences), redesign of the academic offer (psychopedagogy) and incorporation of new subnets (administration).

Besides the academic networks, the SENESCYT has created transversal networks and interinstitutional networks. One or more universities participate in each network. The transversal networks have constituted three: the national

8 To get more information consult: https://goo.gl/dnc1vf/

network for the integral prevention of drug use, the network of higher education and gender, and the network of universities promoting health and welfare. Three interinstitutional networks have also been formed: the biotechnology Network, the metalworking network and shipyards, and the network of agriculture, agro-industry and fisheries. Each of these networks seeks to generate knowledge and research, taking into account the local realities and the relevance of higher education in the development of Ecuador.

On the other hand, it should be pointed out as a system development element the strengthening of existing public research institutions and the creation of new institutions dedicated to that purpose, which makes the country now have eleven public institutes specialized in research and organized in a systemic way, which are: National Institute of Research in Public Health (INSPI), National Institute of Geological, Mining and metallurgical Research (INIGEMM), National Institute of Meteorology and Hydrology (INAMHI), National Institute of Cultural Heritage (INPC), National Institute efficiency and renewable energies (INER), National Institute of Agricultural Research (INIAP), National Fisheries Institute (INP), Ecuadorian Antarctic Institute (INAE), Military Geographic Institute (IGM), Navy Oceanographic Institute (INOCAR) and Ecuadorian Space Institute (IEE).[9]

Another advance that should be highlighted in the national system development is the increase percentage in fourth-level studies in tenured professors at 20.7% (20 percentage points) from 2012 to 2014. The following shows the evolution of this data from the 2012 with its growth projection up to 2017.

Table 5
Tenure professors with fourth-level title

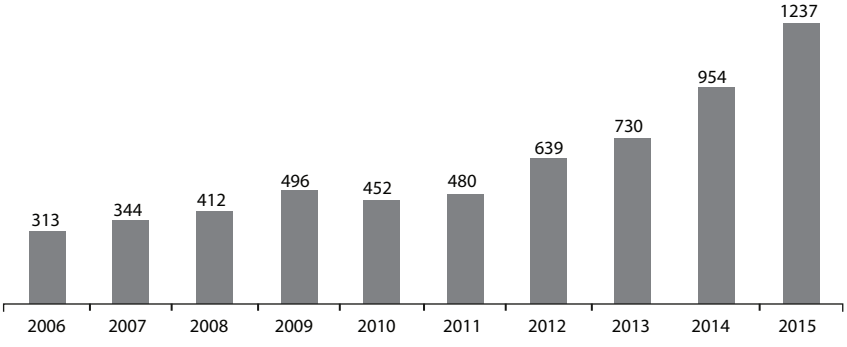
Year	Real data	Projection
2012	54.9%	
2013	67.2%	
2014	75.6%	
2015		78.7%
2016		81.9%
2017		85%

Source: own elaboration

9 To get more information consult: https://goo.gl/QGckwM/

The system development in terms of scientific production has also shown considerable improvement. Ecuador has gone from having 313 indexed publications in Scopus in 2006, to 1 237 in 2017, which means it increased its scientific publishing capacity four times. In addition, 75% of these publications have been the product of research carried out in the IES. This effort to publish has led to the location of the country as the largest percentage increase in the region in recent years, reaching 18% of annual growth (SENESCYT, 2015).

Figure 3
Total of publications indexed in Scopus



Source: SENESCYT, 2015

The system has diversified, broadening its efforts and results in the research, production and knowledge-appropriation planes. It has been advancing for the national development, as can be seen, but there are also great challenges in this area for the development to be balanced, biocentric and for more population to have access to higher education quality and to make science of all kinds all over the country.

Conclusions

To conclude with this analysis, it is important to point out some lines of work to continue problematizing the Ecuadorian reality in terms of the higher education system. In this sense, if higher education is a fundamental

factor for the general and balanced development of Ecuador, what elements are needed to work to regionalize higher education, based on the principles of relevance and social law? The models of regional development of higher education system are based on the presence of higher education across the country or on the mobility of students towards training centers, in this sense: What model should Ecuador use to work with?, What perspective would be the most suitable in terms of resources and relevance?

On the other hand, understanding higher education as a development factor, and thus the generation of professionals as an element of social growth: Can there be more synergy between technological education and third-level education facilitating the continuity of studies and the greater professionalization of the population, without lowering the quality?, what perspectives can be built in this sense?

Finally, it is necessary to outline a central question for the social context of Ecuador: what advances exist and what challenges should be asked for the stimulation of the multicultural, intercultural and biocentric elements in the development of the system?

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