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Science and technology internationalization and the emergence of peripheral techno-dreams: the *Yachay* project case

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ABSTRACT

On the basis of interviews, observations and archival analysis, this article explores the controversies surrounding the *Yachay* project case in Ecuador and unveils three ideological processes behind its conception and implementation. First, we show how the new elite in the government used this project to produce and reproduce a new power structure using a symbolic strategy based on propaganda and on an imaginary of techno-scientific modernization. Second, we unveil the material and symbolic reproduction of a cosmopolitan elite of international experts that profited from the Ecuadorian public funds in exchange for their name and prestige, thanks to a discourse based on cosmopolitanism, urgency, and voluntarism. Finally, we explain how the *Yachay* project has triggered the reconfiguration of the local symbolic sphere according to the new conditions of reproduction of the world system by reshaping the local imaginaries around technology and innovation. We conclude that *Yachay*, like other similar projects that have emerged at the same time in other parts of the world, is part of a global process of reconfiguration of the ideological and institutional conditions that accompany the deployment of the latest wave of techno-economic transformations in the global system.

1. Introduction

Back in 2010, former president of Ecuador, Rafael Correa, and some of his ministers carried out a diplomatic visit to South Korea, where they got to know the *Innopolis Daedeok*'s experience. The impact this visit had on their imaginary could be deemed the origin of one of the most controversial projects in Ecuadorian techno-scientific history: *Yachay*.

Generally translated as "knowledge", the Kichwa word *yachay* refers to the essence of the power of the *yachak*, the "Andean shaman". Contrary to the modern notion of knowledge, which designates a system of objectifiable and transferable ideas, in its original conception, *yachay* refers to a process of inalienable, subjective transformation of the experience of life (Howard 2002, 18). It is a form of "organic knowledge" that cannot be

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learned through the study of texts in any context or at any time (Crickmay 2002, 40). The *yachay* can be experienced; it can be "dreamt as a vision" but it cannot be read.

Far from this complex meaning, the Ecuadorian government used the word *Yachay* as a project's brand. Thus, Correa's government aimed to legitimize and to give an "indigenous" look to a rather classical project of western techno-scientific development. It foresaw the construction of a techno-industrial city and a high-level university dedicated to scientific research, technological development, and innovation (STI). As the South Korean experiment unsuccessfully attempted to do 50 years ago in Asia, the *Yachay* project aimed to become the "Silicon Valley" of the Andes.

Two public institutions, the SENPLADES[1] and the SENESCYT,[2] were responsible for the design and implementation of the project, and to comply with that, both institutions sent officials to a training program in the *Innopolis Daedeok*.

In March 2011, the Ecuadorian government signed an agreement with the *Innopolis Foundation* to get advice on the design of *Yachay* from South Korean experts (Correa et al. 2011). Later on, Ecuadorian officials visited similar programs in the United States, France, Spain, Russia, among others, and signed additional agreements with government institutions, universities, research centers and companies.

In October 2011, the first *Yachay* project implementation plan was launched. A few months later, Correa announced that *Yachay* was to be built on an area of 4500 hectares on the Urcuqui valley, 120 km north of the capital city, Quito. They projected a total investment of 1 billion dollars until 2017 and 20 billion dollars until 2030 (Rodríguez 2013).

However, the implementation process did not start until the constitution of *Yachay* as a Public Enterprise (*YPE*) in 2013. The plan foresaw the construction of a city divided into four zones: university, industrial park, agro-tourism and biotechnology. The university started functioning in March 2014, with 144 students, 44 professors and researchers from different countries and under the management of a special commission.[3] By 2018, *Yachay-Tech* University has more than 1000 students and 125 professors. In its short life, different controversies around the functioning of the commission and the university itself have led to the resignation of five rectors and the replacement of the entire commission in 2017.

Meanwhile, the *YPE* was meant to continue the implementation process of the other components of the project. However, this process stalled for several reasons: a cut in public funding after the fall of oil prices at the end of 2014, different political problems, the lack of expertise and experience of the Ecuadorian officials, and the need for political legitimacy. The last one, in particular, led the former Ecuadorian government to adopt a strategy centered on propaganda rather than on achieving sustainable and concrete results. This strategy showed the fragility of the project and raised questions regarding its feasibility and pertinence. *Yachay* became a platform for the governments' political propaganda, used to feed people's illusion of a techno-economic transformation in order to obtain public support.

The most pathetic example of this strategy was the public announcement of a 3 billion dollar investment to build a "mega-factory" of electric cars in *Yachay*, just one week before the presidential election (*El Telégrafo* 2017). This project, which supposedly had the

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[1]Secretaría Nacional de Planificación y Desarrollo.
[2]Secretaría de Educación Superior, Ciencia, Tecnología e Innovación.
[3]Ares Rosakis (Greece), Guruswami Ravichandran (India), José Andrade (Ecuador) and Fernando Albericio (Spain).

support of *Hewlett-Packard* and *Tesla Motors*, turned out to be a sham invented by the government to get more votes (*4pelagatos* 2018; Cavagnaro and Santos 2018).

Seven years after its conception, *Yachay* seems to be trapped in the realm of techno-dreams. By 2018, the industrial park and the bio-technology zone are still in the planning stage. The agro-touristic zone was only partially implemented. There are infrastructural flaws and lack of necessary equipment (*El Comercio* 2017). Only 40% of the one billion dollar investment planned by 2017 was executed, and half of this money came from Chinese credits.

How did we get here? What led Ecuadorian officials to invest such a large amount of money, time and resources to build this controversial project? Why did the local criticism not manage to stop or reshape the project? Why did international experts decide to contribute to and feed this techno-dream? Can we think of this case as a unique Ecuadorian experience or a global one? We aim to reply to these questions by exploring the controversies surrounding this project and the ideological processes behind its conception and implementation.

2. Contextual, theoretical and methodological background

Before entering the subject, three points need to be explained.

The first one is the context. Ecuador has historically occupied a peripheral position in the world system as a commodity provider. Relatively more isolated and smaller than most of its neighbors, the trajectory of the techno-scientific development of Ecuador has followed more or less the same patterns of internationalization (Kreimer 2006) and institutionalization (Arellano, Arvanitis, and Vinck 2012) identified in the other countries of the region but in a much less dynamic way. This has led to a marginal integration to the international techno-scientific networks and a still very weak internal articulation and institutionalization. For most of the twentieth century, the development of the local techno-scientific field has been based mainly on individual and isolated efforts, making the configuration of a national innovation system (NIS) more a goal than a reality.

Following the institutionalization process that started in the 1970s and the reforms of the 1990s and 2000s, the Correa's techno-scientific policy, of which *Yachay* is part, aimed to fortify this proto-system that currently consists of around 60 universities, 13 public research institutes and another 85 public institutions and NGOs conducting scientific and technological activities. The universities have around 36,000 professors (only 8% of them have a PhD) and half a million undergraduate students (in a country of 16 million people) from which 85,000 get a diploma every year and 18,000 get a postgraduate degree (SENESCYT 2017). The system includes approximately 10,000 researchers, most of which do research part-time. The Research and Development (R&D) expenditures in 2014 reached 0.44% of the GDP, which was twice as much as in 2006 and three times more than the average in the previous decades, but it is still below the Latin American average (0.77%) and the UNESCO target of 1% (INEC 2016).

As for the productive sector, Ecuador has around 850,000 registered enterprises and this number has grown at an average rate of 10% during the last two decades (Schwartz and Guaipatín 2014; INEC 2017). However, 90.5% of these are micro-enterprises and 7.5% small enterprises. The remaining 2%, composed of about 12,200 medium and 3,800 large enterprises, are responsible for 87% of the annual sales. Between 2012 and 2014, half of

these big and medium-sized enterprises introduced some kind of innovation. However, just 3% of them were innovations at an international scale and 30% at the national scale (INEC 2016). Despite some progress in recent years, the productive sector still has little to offer on the local techno-scientific level and the productive structure remains based on commodity exportations and dependent on the importation of industrialized products.[4]

A second point is the theoretical approach and the hypothesis underlying our analysis. Located at the intersection of the works on techno-economical cycles (Schumpeter 1964; Pérez 1983, 2002, 2009, 2015; Freeman and Louçã 2001) and the global system anthropology (Ekholm and Friedman 2008), our interpretation of the *Yachay* Project case aims to understand its place in the broader process of global transformations. We understand this process of transformation from a double perspective. In the first place, we follow the neoschumpeterian arguments on the relations between economical cycles and technological innovations. Accordingly, the big economic crises of the last three centuries are closely related with shifts in what Perez calls the "techno-economic paradigm". As per her historical analysis, these shifts seem to trigger new waves of innovations every half a century, changes that are systematically accompanied by parallel transformations within the institutional and ideological realms. These transformations generally start in specific sectors and countries and then progressively spread until reaching saturation or until a new paradigm breaks through. Therefore, they follow diachronic trajectories among peripheral and central economies. During a first phase, the rise of new technologies dislocates the economy from the institutional and ideological framework and creates the conditions for a structural crisis. These crises lead to a second phase in which political and ideological transformations create new frameworks that allow the new paradigm to develop to its full potential. Along with this line, we suggest that the global crises of 2008 marked the beginning of a new wave of transformations that are helping the ongoing technological revolution to reshape the economy around the world.[5] Our main hypothesis is that the *Yachay* project is a local manifestation of this process.

The second approach we use is based on the critiques raised by Ekholm and Friedman (2008). Therefore, the unit of analysis we use is not a society limited by national-state frontiers, but the global system as a reproductive totality. This means that the economic, political and ideological structures, as well as all the processes that support and reproduce them, transcend the national borders and form a full spectrum of interrelations. This totality has elements, structures, hierarchies and processes, all with different temporalities and spatial influences. Its empirical manifestation is always locally and temporally circumscribed, but its comprehension can only occur at a global scale and from an historical perspective. Thus, the material or economic reproduction processes of local societies, conceptually individualized, are only part of a larger process of total reproduction of the world system. The focus on the global scale and the long-term processes that characterize this approach provide a broader understanding of the systemic transformations, which in

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[4]https://atlas.media.mit.edu/en/profile/country/ecu/
[5]Even if closely related to the wave of the 1970s triggered by microchips, computers and telecommunications, this new techno-economic transformation that began in the 1990s is of a different nature. It is virtual and is linked to the creation of the Web, which allows the public use of Internet, the explosion of the social networks, the big data management and the development of the first forms of artificial intelligence and the virtual machines, undermining the functioning of most of the new big companies, the financial system and the global economy.

turn allows us to go beyond the Eurocentric bias of the neo-Schumpeterian scheme and to explore its implications in peripheral contexts.

Finally, a word on the methodology. Our theoretical approach demands the use of multisite and long-term data. We draw on data gathered from 2012 to 2016. In-depth interviews, participant and non-participant observations and archival analysis were conducted in Ecuador, France and China. In-depth interviews were conducted with seven key informants who worked on the *Yachay* project and in SENESCYT (Ecuador), as well as several CEOs and project managers of innovation centers and start-ups in France and China. Non-participant observation was conducted in *Yachay*, SENESCYT and in an innovation center in Shanghai. Participant observation was conducted for one year in Numa, an innovation center in Paris.

First-hand information was complemented with an extensive archival analysis of gray literature, public documents, and financial and statistical information about the technoscientific policy in Ecuador from 1970 to 2016, and about the *Yachay* project since 2010. We have also analyzed articles and information published about the project on official websites and in the media between 2010 and 2016.

3. A communication breakdown

The lack of experience and training of most of the officials in charge of *Yachay* is probably one of the main factors explaining the trajectory of this project. The heads of the project, for example, had no training in STI issues.[6] At most, as we found out from the interviews, some officials took the 10-day training program on Science and Technology parks in South Korea. This lack of experience and skills drove local officials to rely on Korean expertise and trust them despite the language barrier and resulting lack of clarity in communication.

> I was invited to observe a work meeting between a *Yachay* project official and two Korean experts from the *Innopolis Foundation* and from the *Korea Advanced Institute of Science and Technology* (KAIST). Both were working at SENESCYT. Two Ecuadorian advisors hired under the *Prometeo*[7] program were also invited. The purpose was to define the reference terms of a consultancy mission for the *Yachay* techno-industrial park. The two Korean experts wanted to be hired for this mission. The presentation was quite general: operating principles of a techno-industrial park, advantages of free-trade zones, and economic liberalization. They proposed the implementation of a series of reforms in the most classical neoliberal tradition, contradicting Correa's official discourse, which for the past five years had supported the popularity of his government. After 40 minutes of presentation, the Ecuadorian official surprised everyone by asking his two counselors to translate the entire presentation into Spanish, belying only then his lack of comprehension of English. Nonetheless, the rest of the discussion continued in English, because neither of the Koreans experts could speak Spanish. The language barrier was serious. The English of the Korean experts was not clear either. Moreover, the advisor's translation was very superficial. The project manager seemed to understand nothing. He started asking questions that his councilor had to translate into English for the Koreans and vice versa. After a while, the confusion was such that they were no longer

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[6]René Ramírez (SENPLADES 2008-2011 and SENESCYT 2011–2017) did his MA research on social development indicators and Héctor Rodríguez (SENESCYT 2010-2013 and YPE 2013-2017) did his MA research on indigenous movements and local governments.
[7]A post-doctoral program intended to strengthen local universities and research institutes by inviting Ecuadorian and foreign researchers living abroad.

> talking about the same subject. Neither the project manager nor the Koreans seemed to realize their misunderstanding. (Field notes, Quito, 23/01/2013)

Beyond exposing the lack of training and language skills, this experience also illustrates one of the central problems of the *Yachay* project: its ideological dimension. The communication breakdown between those individuals reveals the existence of a more general process of symbolic transformation in the world system, of which *Yachay* is only a local manifestation. This process can be explained by analogy with another historic episode, much more widely known: the communication breakdown between the Spaniards and the Incan leader Atahualpa, which led to his death.

Howard (2002) used this episode, represented in the play "The tragedy of the end of Atahualpa" (Lara 1989), to analyze the symbolic colonization process of the Andean people. The play portrays an Incan man disturbed by the appearance of signals that seem incomprehensible to him and whose multiplication ends up overtaking his "yachay", making him lose his ability to communicate and control his world. These signals first appeared to him in the form of dreams that showed him beings whose nature and meaning he could not grasp. He then asks his *yachak* for advice but fails to follow it. Finally, he must face a reality so strange that the Inca cannot differentiate it from a dream. This incapacity ultimately leads to his death.

Despite its metaphorical nature, this piece illustrates how a major rupture in the global reproduction process can manifest itself locally in the form of a symbolic incompatibility or a communication breakdown as described above. The *Yachay* project brought not only foreign experts, their languages and cultures, but a new symbolic universe together around technology, economics, politics and culture. This project condenses a series of contradictions found at the crossroads of the indigenous imaginary, used by the government's political marketing; the local imaginary of STI; the imaginary formed abroad among the new elite of students and researchers; the imaginary of Korean, but also Chinese experts, who defined the project guidelines; and the imaginary of all the other experts and "gurus" of the new Californian techno-cultural wave who visited or participated in the project.

Paradoxically, as in the metaphor of Atahualpa, the word *Yachay* also takes here the form of a dreamlike vision – that of a high-tech city, which will finally allow the country to develop. Is this a premonitory dream announcing a great techno-economic transformation? Or, is it but a form of an ideological dream (Žižek 2008)? As a sort of symptom, the communication breakdown described here points to the latter.

The following sections reveal the contours of such a dream operating in at least three interrelated dimensions. First, it has allowed the local elites of a techno-populist regime (de la Torre 2013) to maintain their privileges and power. Second, in search for legitimacy in a locally unknown domain, these elites brought in international experts, creating strategic alliances. This helped this cosmopolitan elite to guarantee or expand their symbolic and material reproduction by profiting from the Ecuadorian public funds in exchange for their name and prestige. Third, by doing so, local elites became the transmission chains and the resonance box of the ideas, symbols, and narratives spread by this cosmopolitan elite around the globe. This triggered the reconfiguration of the local techno-scientific imaginaries according to the new techno-economic paradigm that is reshaping the world system. This reconfiguration has been made manifest locally through legal

reforms, public policies and programs, events, media, cultural products and mega-projects as *Yachay*, and triggered different forms of local resistance.

4. A remote-controlled white elephant: local elites facing the globalization process

Yachay was one of the most controversial projects implemented by Correa's government. While the feasibility and the very meaning of this project were questioned, the elite in power adopted a defense strategy based on the internationalization of the STI local field from a *wishful thinking perspective*. This section analyzes the main criticism raised against the project. It unveils the tensions introduced by the global transformations in the reproduction process of the local elites and the ideological role *Yachay* has played.

For Arturo Villavicencio (2014a; 2014b; 2015; 2016), *Yachay* was an ideological strategy of the government to maintain the enthusiasm of the population and to guarantee electoral support. This strategy used the local imaginary of STI to create an illusion of "hyper-modern" transformation that would solve all the country's problems. He criticized the underlying linear model of innovation behind the illusion that a city dedicated to R&D could reproduce the Silicon Valley experience. This illusion ignored that the success of the Californian model was based on technology produced by hundreds of research laboratories financed with American public funds and fueled with money from financial speculation. Villavicencio questioned the very possibility that *Yachay* was capable of becoming the driving force behind the country's economic transformation, arguing that high-tech industries are generally capital-intensive and create very few jobs (Villavicencio and Rodríguez 2015).

Several analysts echoed these arguments, feeding an increasing opposition to the project.[8] This situation worsened with the political and media controversy triggered by the dismissal of *YachayTech*'s first rector, Fernando Albericio, barely a year after the university's inauguration. Albericio exposed the "irregularities" of the university's management, including some unjustified expenses and the salaries of members of the special commission – deemed too high for the Ecuadorian context.[9] Moreover, he complained to be the only one living and working full time in *Yachay*. His colleagues were earning the same salary while keeping their jobs in California and working remotely for *Yachay*. Albericio criticized the commission's vision and their economic administration (*La Historia* 2015).

However, his colleagues in California disagreed. They wanted to impose the American university model and replicate the *Caltech* or *Carnegie Mellon University* model. They accused Albericio of limited management skills and vision. Andrade, the only Ecuadorian member in the commission, claimed that Ecuador was perfectly capable of developing a "University of Excellence" in the short term, but that they needed a rector who was able to lead the University in that direction. The media controversy hurt the image of the project and the government did not hesitate to give all its support to Andrade, who then temporarily took over the rectorate.

This decision dismissed the complaints and doubts around the project and triggered a wave of criticism attacking the "messianic" style of the project managers' discourse and

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[8]See for example: Macias-Vázquez and Alonso-González (2016), Purcell, Fernández, and Martínez (2016), Ledesma and Cobos (2016) and Carrión and Calva (2016).
[9]$16,300 per month plus travel and living expenses (more than 40 times the local minimum wage).

the waste of public resources (Oviedo 2014). According to Hernández (2015), the project had at least six defects: the imposition of voluntarism over reflection and evaluation; the mystification of discourse through symbolic manipulation of the imaginary on technology; the waste of public resources in order to form a very small elite at an exorbitant cost; the imposition of the official imaginary by annihilating any criticisms to this policy; the disregard for the importance of processes over that of the media show; and the replacement of organic intellectuals by a technocracy that sees itself as a self-legitimized elite through its diplomas and technical expertise and who remain faithful to the charismatic leader.

Other researchers questioned the dangers of the elitist, technocratic and authoritarian rationale of the state and the risks this entailed for the future of the higher education system (Ortiz 2015; Sierra 2015). Paul Toasa (2015) questioned the media's attention on the high salaries of the commission members. In his view, the problem was the combination of an excess of "patriotic enthusiasm" and the lack of training or scientific experience of the officials responsible for the project. Santiago Bucaram (2015) focused on the symbolic dynamic behind the project. For him, *Yachay* was an illusion created on the basis of symbolic reproduction mechanisms similar to that of the "magic thought" present in the "cargo cults". According to his reasoning, this symbolic approach led government officials to confuse scientific, technological or economic development with the acquisition of a large number of symbols of modernity ("university of excellence", "world-renowned teachers", "competitive salaries", "indexed publications", "Fablab", "start-up", etc.). This misconception about the techno-economic development problem, he said, will eventually lead to failure.

Mystification, elitism, authoritarianism, overspending of economic resources, technocracy and ideological confusion summarize the criticisms against the *Yachay* project. At the border between the real and the imaginary, the history of this project shows how a new elite composed mainly of middle-class intellectuals, bureaucrats and business people – who accumulated capital and power during Correas' administration – used the surplus produced during the expansion phase of the peripheral economic cycle (2007–2014) to produce and maintain a new power structure. This structure was based on the instrumentalization and strengthening of the government control over the media, the Courts, the Assembly, and the use of the public budget for the benefit of their businesses and political patronage but also to subordinate the elites linked to the financial and commercial capital (Basabe and Martínez 2014). This group of elites used a symbolic strategy based on propaganda and the mobilization of a techno-scientific modernization imaginary to justify the policies, actions and programs that let them increase their power. Given the absence of a local techno-scientific culture and the weaknesses of the education system, this symbolic strategy has led to the mystification of these imaginaries and their transformation into a kind of ideological device.

The ideological character of this project has been unveiled not only by the symbolic resistance of its critics but also by the inversion of the trajectory of the peripheral economic cycle (2014–2017) which showed the limits of the government's strategy. However, even if the promised techno-economic transformation has not taken place, the changes already implemented are very likely to have long-term consequences. Certain devices introduced into the symbolic reproduction process of local techno-scientific elites have already started to produce some unexpected effects. These elites, whose reproduction was previously regulated locally, are now faced with a global reproduction process. The process of internationalization of the higher education system through the

scholarship program, the recruitment of foreign teachers and researchers and the adoption of international evaluation parameters are transforming the local techno-scientific landscape. In this regard, the debate and criticisms that rose against *Yachay* can in a way be interpreted as a local form of resistance to the process of peripheral integration into the global techno-scientific system.

This "great white elephant" gives us some clues to understand the relationship between the transformation processes of the global system, the local cycles of economical, political and symbolic reproduction and the role of the government's techno-scientific transformation strategy.

5. From Mars to Urcuqui: the local reproduction of a global elite

The criticisms analyzed in the previous section have unveiled the ideological nature of this project and how it was used for the political and economic reproduction of the ruling elite. This section examines the project promoters' arguments, whose urgency and cosmopolitanism reveals a second ideological function of this project: justifying the material and symbolic reproduction of the globalized scientific elites.

The defense of the project was structured around five strategies. First, to promote the image of *Yachay* as an investment in order to dissolve the idea that it is a waste of money. Second, to highlight the importance of attracting "international human talent" and creating links with global techno-scientific networks. Third, to justify the fact that the members of this commission work abroad because their function was to raise funds and this task requires experience and prestige on a global scale (*Ecuadorinmediato* 2015). Fourth, to blame the Ecuadorian University for "provincialism" and to, therefore, call for the building of a "world-class" university by hiring "top level" international experts. Finally, to claim that the changes needed to happen fast. Creating a new university would ostensibly allow Ecuador to make a qualitative leap very quickly with visible results in 10–15 years (Andrade and León 2015).

> What is the fear of having a cosmopolitan university? […] The "hyper-provincial" vision of the higher education system must be stopped […] Albericio's exit is due to two opposing visions of university. He believes that we cannot pretend that Ecuador will become California or Massachusetts. We believe that we can be anything we want. […] Albericio did not think the same thing […] He wanted to make a university for the children of our children's children. We want it to be for our children. (Ramírez and Estrella 2015)

It seems like the origin of the problem lies precisely between these two orientations: cosmopolitanism and urgency. As Villavicencio argues, the project managers' lack of experience led them to want to transpose foreign models to a completely different local reality. Moreover, the government's urgency to make visible and immediate changes has overlooked the fact that there are systemic processes that cannot be shortened. This led to contradictions between the plans announced and their implementation but also between the principles that the promoters claim to defend and the actual orientation of the project.

The reaction of the project promoters to these criticisms has been to disqualify any opponent and to place the debate in the ideological sphere of utopias, personal motivation, self-confidence, patriotism and faith. José Andrade's reactions to Albericio's dismissal is a clear example of this voluntarist and utopian discourse, but taken to an even galactic scale:

> I'm opening *Skype* on my *Mac* to connect to a meeting, this time from Barcelona, where I came to give a lecture on my scientific research. As usual, NASA's *InSight* Scientific Committee [with whom I am collaborating] is meeting virtually […]. We are scattered all over the world, but our mission is outside this world […] I see in NASA's mission some analogies with *YachayTech*. As in this university […], NASA's mission is led by an international committee that does not live in Cape Canaveral (where the rockets are launched), or Houston (where they are controlled) and - of course - even less on Mars (where the mission takes place physically). This committee does not have an exclusive partnership with NASA, even though they are responsible for launching a $500 million mission out of American public funds. In Ecuador in the last few weeks, the debate around the *Yachay* project has focused on some of these elements […] Why are public companies like NASA or private companies like Apple and universities like *SkolTech* trying to work with people who don't have an exclusive relationship with them? Are they colonized by snobbery from a group of academic wise men? […] The main reason for the existence of these committees is precisely their external character […] they bring their global vision and give an intangible value that attracts investment and human talent for these institutions: credibility. Without it, it is impossible to institutionalize a new project […] *YachayTech*'s model is not snobbish, but pragmatic. (Andrade 2015)

Thus, by using the symbolic capital produced by his collaboration with NASA, Andrade tries to shift the debate from the local sphere of the "provincial" elites and the problem of creating a university using public funds to the global sphere of cosmopolitan elites and the techno-scientific production and reproduction of the "excellence" of which he claims to be a part.

> How many critics of the *YachayTech* model have run a university or created something new as we are trying to do now in Ecuador? [The management committee] had a global influence and this is transcendental. Because we are not creating a local experience, but a global one. (Andrade and León 2015)

The problem for him was not about money expenditure or working remotely, but instead about how he and his colleagues could contribute to the development of the university. He supported this argument by the fact that they planned to finance the university with a model based on investments and donations and for this they needed an international network.

According to his arguments, the issue of global techno-scientific reproduction was essentially a credibility problem. From his perspective, the condition of being a cosmopolitan scientist justified not only working simultaneously in California, in Urcuqui and perhaps in Elysium Planitia, but above all the fact that the Ecuadorian State had to finance its personal project in exchange for inserting the country – or at least an elite from the country – into the global techno-scientific network.

> *Yachay* does not want us to be isolated and chained up in Urcuqui, because our activity is not only in Ecuador, but also in the world. I am a teacher and researcher. I am on the editorial boards of the best journals in the world. I am a global consultant […] From out of my lab came companies that have introduced products to the market. This is the work of a world-renowned scientist. […] The critics who ask [me] to leave all these activities in order to demonstrate our faith in the project ignore world science. (Andrade 2015)

Hence, Andrade produced a second narrative capable of "keeping the enthusiasm for the project alive", in which *Yachay* acquired a sophisticated symbolic appearance, such as that of a space mission to Mars. By highlighting the fact that he was able to launch and steer a robot to another planet, he sent the illusion around the dream of techno-scientific

development embodied by *Yachay* into the stars. The voluntarist mantra "*If we want to, we can*" resonates in Andrade's speech.

> To create a new product, we need people, human talents, who believe that they can change the world. *YachayTech* does that with its students. We implant in them the chip of innovation, the idea that anything is possible. (Andrade and León 2015)

With this rationale, *Yachay*'s greatest challenge was not the material but the cultural constraints. According to Andrade, the most important change to be implemented was the creation of a culture of innovation, entrepreneurship and risk-taking in the country. The challenge of trying to build a "cosmopolitan university" with "world-class" researchers and teachers capable of developing nanotechnology, artificial intelligence or "conquering space if necessary" was, in a way, an attempt to put their discourse into practice. They had created their technological dream and were now trying to prove that they were capable of manifesting it.

> This process will have medium-term results when the first students finish their studies and become the new leaders. [...]. The first technologies will come out in 5 or 10 years and we will have the first PhDs trained in Ecuador and they will create new Ecuadorian technology companies. The new horizon is set at 15 years, when we will have our own *Google* or a new *Whatsapp*. (*El Telégrafo* 2015)

However, this "inspiring talk" could not dispel criticism. The seemingly inexhaustible flow of public resources closed abruptly after the fall in oil prices at the end of 2014. This undermined the functioning of the university, which delayed the construction of several infrastructures, the installation of equipment, and the recruitment of teachers and researchers.

6. Between an Asian flu and the new California fever

Previous sections unveiled the symbolic tissue surrounding this "enterprise", which allows us to identify the main points of controversy and the various arguments raised by multiple actors. Based on this analysis, we suggested that this project has served as an ideological device used to guarantee the reproduction of the local elites linked to the government and certain cosmopolitan elites at a global scale. This section explores another function of this ideological device: the internationalization of the Ecuadorian techno-scientific system. We see this process as the local manifestation of a global transformation, which includes the change of the techno-economic paradigm and the shift of the global hegemony (Pérez 2002; Ekholm and Friedman 2008).

Yachay condenses different imaginaries whose evolution reflects the process of reconfiguration of the world system. The analysis of the discourses around the project shows an evolution of the language, conceptions and symbols mobilized during the last seven years. This evolution and the juxtaposition of symbols and discourses responds to the influence of the various actors who contributed to the project in its different stages, but also to the general influence of the new techno-economic paradigm whose deployment started after the 2007–2008 crisis.

The influence of Korean experts, for example, determined the design of a project under a model already considered obsolete (Villavicencio 2014a, 206). Indeed, the idea of building cities and techno-scientific parks of this kind has already experienced at least four

waves since the 1950s.[10] The same *Innopolis Daedeok* was one of the experiments that started in the 1970s. Paradoxically, at its origin, we find the failure of a project whose resemblance with *Yachay* offers up some elements not to be neglected.

Originally called *Daedeok Science Town*, this project was part of a long-term techno-scientific development plan elaborated in 1968. Like *Yachay*, *Daedeok*'s creation was influenced by experts from experiences that preceded it, notably those of *Novosibirsk*, *Tsukuba*, *RTP* and *Silicon Valley* (Lee and Kim 2016). Similar to *Yachay*, the "master plan" foresaw an "ambitious", "avant-garde" and "ecological" urban design. Its construction was delayed until 1974, but also like *Yachay*, an oil-related crisis cut off the project's funding and forced officials to revise the project, lower targets and extend deadlines under new budgetary conditions. The infrastructure was not completed until 1992. According to Lee and Kim (2016), during these two decades the *Daedeok Science Town* project was a state-run island with no links to local actors, very weak ties to the productive sector and few entrepreneurial activities.

Only in 1997 did the park change direction: it was reoriented towards commercialization and technological innovation and changed its name to *Daedeok Valley*. The government's political and financial support during this period boosted entrepreneurship at the local level. However, the effect of this boom was limited due to the high costs of technology transfer and the lack of evaluation policies.

The relative failure of this second experiment led to a new configuration in 2005, aimed at positioning it internationally as a "world-class innovative cluster" (Innopolis Foundation 2005). Renamed *Daedeok Innopolis*, the park was forced to strengthen its interactions with local businesses while beginning to develop activities on an international scale.

In 2008, the Science and Technology Park training program was created to share and promote *Innopolis'* experience and model to manage techno-scientific parks, with the aim of offering consulting and cooperation services to countries wishing to develop such projects (Innopolis Foundation 2014). It was precisely in this program that the Ecuadorian officials who started the *Yachay* project were trained. From 2010 onwards, *Innopolis* began an international marketing campaign to sell "techno-scientific parks" and through the *Korea Innovation Cluster Foundation* signed two agreements to export the *Innopolis* model: one in Ecuador, which became the *Yachay* project, and a second one in Kazakhstan.[11]

It was on the basis of this rather erratic trajectory and its questionable success that the Korean advisers defined the guidelines of the *Yachay* project. These guidelines led the Ecuadorian project managers to make decisions in an area that was foreign to them. Moreover, the similarities of the *Yachay* project with *Daedoek*'s first model, which the same Koreans failed to set up, make it appear as if these experts hadn't read their own history. The consequences of the Korean failure are, in fact, a warning about the possible challenges that *Yachay* will have to face in a few years.

For Ecuador, this project represented the equivalent of roads, railways, power plants or telecommunications networks that brought about the previous waves of global techno-economic transformation. In the imaginary of policy-makers, *Yachay* was the "infrastructure"

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[10]*Silicon Valley* (USA 1950s), *Research Triangle Park – RTP* (USA 1959), *Akademgorodok* à Novosibirsk (RUS 1960s), *Tsukuba* (JAP 1960s), *Boston Highway 128* (USA 1970s), *Daedok* (KOR 1970s), *Sophia-Antipolis* (FRA 1970s), *Cambrigde* (GBR 1970s), *Kansi* (JAP 1980s), *Hsinchu* (TWN 1980), *Technopolis* (JAP 1980s), *Cartuja'93* (ESP 1990), *Multifunction Polis* (AUS-JAP 1990) (Castells and Hall 1994).
[11]The Korea-Kazakhstan Technology Cooperation Center (KKTCC) out of business since 2012 (KKTCC 2012).

needed to rise in the wave of the cognitive economy that emerges with this new cycle of systemic transformation. For the Korean consultants, it was most likely a successful business transaction of Korea's new industry: techno-dreams (Castells and Hall 1994, 8).

The Korean experts were not the only ones involved in the symbolic production process of this project. Indeed, the influence of American, European and Latin American actors was also fundamental: experts from *Caltech* and other American and European universities; foreign academics hired directly by *Yachay* or under the *Prometeo* program; and above all, the various speakers invited by *Yachay* at numerous events organized since 2013, including several innovation "gurus" such as Steve Wozniak (*Apple*), Jeremy Abbett (*Google*) or Jonathan Medved (*OurCrowd*).

While the influence of these actors was not able to change the overall design of the project, they somehow shifted the imaginary of policy makers from a traditional linear innovation model to a more systemic model inspired by the new trends in *Silicon Valley*. However, given the constraints imposed by the choice of building a new city rather than strengthening the growth nodes of an already existing system, this evolution of discourse is in permanent contradiction with what gets put into practice. They thus mobilize a series of catchwords of the new wave of the "California fever": innovation ecosystem, camp, start-up, incubators, coworking, accelerators, angels, big data, hackathons, open source, crowdfunding, etc. without having a substrate that gives concrete content to these signifiers and without physical or social significance. This allows them to give a vanguard look to harmless practices or create mirages where there is nothing but wind. A day laborer can hereby become a "freelancer", the local grocery store a "start-up" and 700 bureaucrats an "innovation ecosystem".

Thus, *Yachay* serves to channel, transmit or amplify these symbolic currents associated with the reconfiguration process of the world system, fulfilling the third ideological function: to strengthen the internationalization process of the local techno-scientific field through the reconfiguration of the local symbolic sphere according to the new reproduction conditions of the global system. Thanks to this function, ideas such as self-entrepreneurship, flexibility, freelancing, start-ups, crowdfunding, universal wages, etc. enter the symbolic "current" of peripheral zones, weaken the old symbolic structures linked to wage earners, social security and even capital, "viralize" themselves and create the conditions for the reorganization of the material reproduction process. As this process comes to an end, it makes more and more sense for us to set up a channel on *YouTube*, register our car on *Uber*, our house on *Airbnb* and ourselves on *Tinder*, than to look for a permanent job, join a union, save for retirement or meet people at the local bar. This new symbolic configuration is the code contained in the chip of "innovation, entrepreneurship and risk", which Andrade's inspiring talk said he wanted to implant in the minds of *Yachay* students.

This phenomenon does not seem to be exclusive to a peripheral country like Ecuador. Data from complementary fieldwork carried out in France and China revealed that these kind of projects associated with innovation have played a central role in transmitting and reproducing the imaginary conveyed by the new techno-economic paradigm that has been unfolding since the 2007–2008 crisis.

In Paris, the Numa[12] center is one of the main spots for meeting and disseminating California's new techno-entrepreneurial culture. It is not insignificant that the association

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[12]This name is a mix between the French words "numerique" and "human" aiming to mean "digital human".

behind this project is called *Silicon Sentier* and *Google* is one of its partners. Created in 2000 by a group of entrepreneurs from the digital sector in Paris, many of whom had experience in the United States, their goal was to promote entrepreneurship and support small, innovative businesses. However, it was only in 2008, precisely at the start of the crisis, that they opened the first co-working space in France –*La Cantine*– and in 2011, the first company accelerator, *Le Camping* (NUMA 2013).

Since we started our fieldwork at the end of 2013, the number of co-working spaces, incubators, accelerators and other innovation centers in Paris and around the world has skyrocketed. NUMA also opened new innovation centers between 2015 and 2016 in Bangalore, Casablanca, Moscow, Barcelona and Mexico City. Looking ahead, the *Skolkovo* and *Innopolis* projects in Russia, *Masdar* in the Arab Emirates, *Konza* in Kenya and *Yachay* in Ecuador, although inspired by a model that seems obsolete today, are part of the same wave of reconfiguration of the global technological landscape.

This phenomenon of global "viralization" of this type of place shows the scale and speed of this process of general reconfiguration of the symbolic sphere of the global system. This reconfiguration, of which the *GAFA* and other Silicon Valley "unicorns" such as *Uber* or *Airbnb* are the focal point of contagion, is changing not only our imaginaries and the way we look at the world, but also the process of material reproduction itself. Ultimately, what is changing is the way capital is reproduced and its relationship to labor. In this sense, not only *Yachay*, but all these "environments" associated with technological innovation around the world constitute a kind of ideological device whose function is to prepare the symbolic ground for the deployment of the new techno-economic paradigm that is underway.

Interestingly, China seems to be the only place – to our knowledge – that despite the symptoms has not developed this Californian fever. They do not dream of producing technology – they're already doing it. This gives them a privileged position to use the global capital reproduction process, because they do not suffer from techno-hallucinations obscuring their gaze. They know, use and manufacture the symbols that give substance to other people's hallucinations, but they do so without losing sight of their main objective: to accumulate capital. Whether we are trying to set up a drones start-up in *Yachay*, or to develop a mobile application for extramarital dating in Paris or to sell some *bitcoins* in London, sooner or later we will all have to pay a supplier in China for chips, phones or bits.

The interview with Joseph, the director of one of these innovation centers in Shanghai, illustrates a pragmatic tendency to assimilate the ongoing transformation.

> "The start-up market is not lucrative because they are very naïve." Joseph was looking for more profitable companies. He explained that in Shanghai there were several spaces like this one, but that they were very small and most of them belonged to the government. He decided to create this space to sell his consulting services with his network of investors. I asked him if there were any companies that managed to get off the ground and he answered, "Honestly, they have not. Only one managed to raise money, but no more than that". […] For him, start-ups were just a "trend", not more than "blah-blah". He confided to me that he was using the televisions that were behind me to channel "TED talks" all day long. His goal was to "inspire" the young people who work in his space so that they believe that they will succeed in setting up their businesses and continue to use his services. However, for him, these "inspirational talks" were just "Western propaganda" that made no sense in China. (Field notes, Shanghai, 8 July 2014)

Unlike the Korean discourse which had succeeded in selling an outmoded technological dream to the Ecuadorian government, and the "inspiring talks" of California model

gurus who are extending their networks and the new techno-economic paradigm around the world, the discourse of Chinese actors in the face of these symbolic transformations remains pragmatic and direct: with or without the technological glitter, "business is business". It is in the interaction of these three symbolic but geographically based realms that the transformation of the world reproduction process has begun in recent years. The resulting unwinding of tensions and contradictions will define the new hegemonic configuration of the world system in the coming years.

In the case of *Yachay*, these tensions shifted towards Chinese pragmatism. Indeed, it was not the "inspiring talks" of the project managers that ultimately secured the financing to continue the project, but the pure and simple greed of the Chinese bankers and subcontractors who knew how to seize a "good business opportunity".

7. Conclusion

Yachay is still far from becoming the hearth of the Ecuadorian techno-economic transformation for which it was created. Several economical, political and ideological factors have undermined its implementation. This article has focused on the latter: the ideological factors. Based on the analysis of the discourses and controversies surrounding this project, we have identified the main criticisms that rose against it, but also the main arguments and strategies used to defend it.

The analysis of these arguments, strategies and criticisms has led us to conclude that *Yachay* has been configured as an ideological device with a triple function: first, the political and material reproduction of the local elites in the government; second, the material and symbolic reproduction of a cosmopolitan elite of international experts that have participated and profited from this project; and third, the reconfiguration of the local symbolic sphere to enable the diffusion of the new techno-economic conditions brought on by the ongoing global transformations.

The internationalization of the STI local field is, therefore, the result of the interaction of these ideological functions. Like other similar projects that have emerged recently in other parts of the world, *Yachay* turned out to be a peripheral manifestation of this global process.

Disclosure statement

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