

## **Assembling peripherals. Networks of exchange and Colombian techno-culture in the 1980s**

**Fabian Prieto-Nanez**

### **Introduction**

The dystopic world imagined by English writer George Orwell in his novel *1984*, arrived in to US TV screens in January, 1984. It was represented in the iconic advertisement of the California-based company Apple, who broadcast it in the super bowl, one of the most celebrated events in the US. The aesthetic of that future, extended the landscape of Ridley Scott's movie *Blade Runner*. As described by Ted Friedman (2005)

“The ad opens on a gray network of futuristic tubes connecting blank, ominous buildings. Inside the tubes, we see cowed subjects marching towards a cavernous auditorium, where they bow before a Big Brother figure pontificating from a giant TV screen. But one lone woman remains unbroken. Chased by storm troopers, she runs up to the screen, hurls a hammer with a heroic roar, and shatters the TV image.” (p.102)

This disruption with the industrial world, however, started a new era of surveillance where apple products make a great contribution. Around these years, Apple started a national campaign to suit copyright infringements, which later expanded into countries like Taiwan, Korea, and Brazil. Whole in the Steve Jobs' biography (Isaacson, 2011) tinkering and hacking are considered disruptive actions, similar practices were performed around the world, under an increasing global reach of Copyright. (Tinn, 2011) Simultaneously stolen chips, software copies in US, and computer parts that entered the black market of arms and drug trafficking do not appear in the glorious genealogy of Silicon Valley.

In this paper, I want to consider the events that took place in Colombia as an example of the multiple locations that shaped the myth of “digital universalism” (Chan, 2014). In the first part, I propose a postcolonial approach to histories of computing, as a way to locate this story in the power relations that shape technologies across the world. As several categories can be criticized by postcolonial theory, the possibility of recognizing different emergencies of computing allow us to engage with the coproduction of computing as knowledge.<sup>1</sup>

In the second part, I rely on my archival work to focus on a series of newspaper articles from the Computer section of Colombian Newspaper *El Tiempo*. This section opened in 1983 as a strategy to popularize computers, and by 1984, it served to encourage the development of informatics through microcomputers importation and expansion of education for software development. First I follow a debate between local engineers and the government against the production of hardware in the country. Although those arguments involved economic reason, disagreement also included opinions about Colombian and Latin American culture, supported in the emergent expertise of these engineers.<sup>2</sup> A concrete case was an article written by the Computer Section editor, Enrique Santos Calderon, about a computer that was assembled in Bogota, Colombia. Named as the “Colombian Computer”, this prototype brought together a network of local businesses that increasingly support the consumption of electronics by Colombian population. The article stressed the manual labor and condemned the project to its failure. Although the project was led by an electrical engineer, disparities on expertise also represented access to education and knowledge in Colombia. Santos Calderon graduated from Universidad de

---

<sup>1</sup> Sheila Jasanoff, *States of Knowledge : The Co-Production of Science and Social Order*, International Library of Sociology (London ; New York: Routledge, 2004).

<sup>2</sup> Timothy Mitchell, *Rule of Experts : Egypt, Techno-Politics, Modernity* (Berkeley: University of California Press, 2002).

Los Andes, the university that first launched a program in computer and systems engineering, in alliance with development agencies and computer business multinationals.<sup>3</sup> Engineers from this university had a great role in designing the technological future of the country, through a network that connected them with metropolitan elites. (Gunder-Frank, 1969). Such technological future is a central topic on current discussions about innovation with its imaginaries and anxieties. As such this historical approach wants to bring into the front the power relations that have been shaping technological uses and engagements in a country like Colombia.

### **Postcolonial histories of computing**

In the early 1990s, Indian historian Dipesh Chakrabarty proposed an agenda for “provincializing Europe.”<sup>4</sup> According to Chakrabarty, philosophers, historians, and other scholars who shaped the nature of western social science developed their theoretical and empirical projects to embrace the entirety of humanity. However, they also produced this knowledge in relative, and sometimes absolute, ignorance of the histories and experiences of those living outside of the western world. In his response, Chakrabarty sought to demonstrate how our categories may be more contingent, and less universal, than we have accepted—often without evidence. In other words, this historical method promotes a more limited and thus accurate use of core concepts that usually are translated without any problem, making the provincialization of Europe a cautious engagement with historical research.

Since that time we have seen a rise in what is called *postcolonial studies of science and technology*. Ultimately this field seeks to reevaluate our theories and systems of society and

---

<sup>3</sup> Fabián Mauricio Prieto Ñañez, *Ingeniería De Sistemas Y Computación, 1968-2010 : Los Pequeños Números Que Hemos Visto Cambiar* (Bogotá: Ediciones Uniandes, 2015).

<sup>4</sup> Dipesh Chakrabarty, *Provincializing Europe : Postcolonial Thought and Historical Difference*, Princeton Studies in Culture/Power/History (Princeton, N.J.: Princeton University Press, 2000).

technology in light of the ways that they are influenced by the long history of colonialism. Such discussion on what postcolonial science and technology studies mean for historians of computing offer a methodology in which local histories are connected to the grand narratives by highlighting several point of connection through cultural systems.

In the field of human-computer interaction, Kavita Philip, Paul Dourish, and Lilly Irani developed the concept of *postcolonial computing*.<sup>5</sup> Bringing elements of science and technology studies (STS) and postcolonial theory, the authors suggested that postcolonial science studies can do more than expand answers to questions already posed. Instead, STS can generate different issues and, more importantly, different ways of looking at the world. They brought histories and anthropologies of colonial technoscience together to map the production of knowledge and experiences of computing across the globe, allowing us, for example, to look for work that is out of the bounds of this regime.<sup>6</sup> In that sense, their approach guides histories of computing by reconsidering spatial divides, such as east/west or here/there, or by how in a world of uneven power relations the very presence of an observer can impact what is being observed. According to Warwick Anderson, postcolonial intervention “offers us a chance of disconcerting conventional accounts of so-called ‘global’ technoscience” by considering how dichotomies emerged under colonial regimes.<sup>7</sup>

On the one hand, as expressed by Amit Prasad, postcolonial science and technology studies can offer useful analytical tools to move beyond older ways of doing history that relied on artificially inflated west/non-west or developed/developing dichotomies, as well as north/south

---

<sup>5</sup> Kavita Philip, Lilly Irani, and Paul Dourish, "Postcolonial Computing: A Tactical Survey," *Science, Technology & Human Values* (2010).

<sup>6</sup> Ibid.

<sup>7</sup> Warwick Anderson, "Introduction: Postcolonial Technoscience," *Social Studies of Science* 32, no. 5/6 (2002).

technocultural divides.<sup>8</sup> In the place of these dichotomies and divides, Chakrabarty and others encourage us to be better scholars and investigate the actual relationships. On the other hand, we can put into broad relief the uneven terrains of technoscience networks and flows. Here we can move past an established map of national histories of computing to the flows and exchanges that characterize the actual production of scientific and engineering knowledge. Postcolonial contributions to the history of computing may help us better understand the impact of diasporas on the traditional concept of the nation-state and national histories and, moreover, to replace the mechanical “adoption and impact” with translation.

We can use the role of the nation-state and national histories as an example of potential postcolonial contributions. Mary Louise Pratt coined the term *contact zone* to describe social spaces where “disparate cultures meet, clash and grapple with each other, often in highly asymmetrical relations of dominance and subordination.”<sup>9</sup> In that sense, we can reevaluate the porosity of the nation-state, especially when considering the transnational networks that operate through it. This is the case for the entangled development economics and computing that characterized the Taiwanese entrance of computing technologies, which later give room for the emergence of the tinkering practices of microcomputing manufacturing.

Postcolonial approaches to the history of computing can also invite us to revisit the ways we understand the spread of computing technology. Often, implicitly or explicitly, this spread is understood as adoption or impact, as in the work of science historian George Basalla. Postcolonial methodologies stress the politics behind transfer or appropriation, particularly in the processes of

---

<sup>8</sup> Amit Prasad, "Science in Motion: What Postcolonial Science Studies Can Offer," *Electronic Journal of Communication Information & Innovation in Health (RECIIS)* 2, no. 2 (2008).

<sup>9</sup> Mary Louise Pratt, *Imperial Eyes : Travel Writing and Transculturation* (London ; New York: Routledge, 1992).

translation that occur in contact zones, both in the linguistic sense and the geometric sense, referring to the movement of a figure from place to place.<sup>10</sup> With translation, Philip, Irani, and Dourish addressed how knowledge circulates in other moral and symbolic economies, allowing us to frame ideas of diffusion as a multiple-direction process where we can even look for signs of opposition.

A postcolonial history of computing does not neglect the historical centrality of particular spaces or groups. Instead, it may give us a new set of tools to understand the multiple social forces that converge in these locations. It can contribute to the global understanding of the larger systems of material and knowledge production and distribution essential to computing. As Nathan Ensmenger showed, the computer industry is built on more than just abstractions, algorithms, and information: the global life cycle of a typical laptop computer links mines in Africa and South America, factory cities in China, retail stores and homes across America, and disposal sites in Ghana.<sup>11</sup> This structured and global life cycle may find corollaries in the production of academic knowledge. Chakrabarti noted a division of labor where academics located in the North Atlantic produce theories while scholars around the world must bring local cases to complement or extend them.

### **Socialist digital technologies for development**

The decade of the 1980's represented for Latin America, both the introduction of neoliberal structural adjustment and the promotion of democratic rule. For Duncan Green, the debt crisis and

---

<sup>10</sup> Kavita Philip, Lilly Irani, and Paul Dourish, "Postcolonial Computing: A Tactical Survey," *Science, Technology & Human Values* (2010)

<sup>11</sup>N. Ensmenger, "Computation, Materiality, and the Global Environment," *IEEE Annals of the History of Computing* 35, no. 3 (2013)..

structural adjustment coincided with Latin America's return to "(more-or-less) democratic rule".<sup>12</sup> Although Colombia was not an exception, the country did not experience a high debt, and politically democracy was threatened not by military dictatorships, as in other Latin American countries, but by insurgent and revolutionary guerrillas. In 1982, Belisario Betancur was elected as president of Colombia. Politically, Betancur attempted to seek a peaceful settlement of the increasing presence of leftist guerrilla groups through peace negotiations. In economics, his conservative government developed a policy of protection by restricting imports and supporting industrial export.<sup>13</sup>

The Colombian manufacturing sector contracted when the world economy entered the 1980's period of recession. As David Bushnell has shown "between 1979 and 1983, for the first time in half a century, industrial employment fell substantially [in Colombia], from 517,000 to 472,000, or almost 6 percent."<sup>14</sup> It was very significant that while the "formal" manufacturing sector of established firms represented this decline, an informal manufacturing sector started to emerge, especially to supply larger firms through subcontracting part of the production process. To protect the national industry the government opted to intervene imports. Although the policies were successful for textile and book publishing industries, the emerging sector of informatics, led by local engineers and multinational corporations, criticized those measures because they increase the cost of digital technologies. But more notably, they were concerned about the government intention to develop a local informatics industry.<sup>15</sup>

---

<sup>12</sup> Ankie M. M. Hoogvelt, *Globalization and the Postcolonial World : The New Political Economy of Development*, 2nd ed. (Baltimore, MD: Johns Hopkins University Press, 2001).

<sup>13</sup> David Bushnell, *The Making of Modern Colombia : A Nation in Spite of Itself* (Berkeley: Univ. of California Press, 1993).

<sup>14</sup> Ibid.

<sup>15</sup> El Tiempo (May 28, 1984) "Urge definir las reglas de juego". p. 13-B.

By 1983, Belisario Betancur created an alliance with the government of France for the development of informatics aimed to primary and secondary education, technology diffusion to rural communities, and the creation of a new informatics industry<sup>16</sup>. The direct agency that was in charge of these deployments was the Centre Mondial, Informatique et Ressources Humaines (World Center of Informatics and Human Resources). Located in Paris, the center participated in the design of public policies in informatics for countries in Latin America, Africa, and Asia during that decade<sup>17</sup>. In the field of education, the program was central to the spread of constructivist pedagogy, as Seymour Papert and Nicholas Negroponte, from the MIT Media Lab, joined the World Center to take part in the deployment of various pilots of programming learning tools. As Papert stated, "For now this is the only place in which we can work." In France, "even the President is personally interested in our work."<sup>18</sup>

The strategy, framed under French development aid programs, was a national project as well. The socialist government of Mitterand developed a plan designed to strength the backward French computer industry against the United States and Japan. Such strategy followed the ideas of French politician Jean-Jacques Servan-Schreiber author of the book "The World Challenge". The main argument of Servant-Schreiber's book was that industrial progress based on natural resources should give way to an advance based on knowledge and mastery of new technologies.<sup>19</sup> As the process of automation seemed like a future cause of massive unemployment, computers would be the only possibility for creating new jobs. The newborn Silicon Valley Industries exemplified this advance, as companies with reduced capital became stable with the commercialization of

---

<sup>16</sup> Presidencia de Colombia. (1982) *Cambio con Equidad. Development Plan.*

<sup>17</sup> William Echikson, "Microcomputer Center in Paris," *The Christian Science Monitor*, June 2 1982.

<sup>18</sup> Ibid.

<sup>19</sup> Jean Jacques Servan-Schreiber, *The World Challenge* (New York: Simon and Schuster, 1981).

microcomputers applications. Moreover, this model could be translated into third-world countries to leapfrog them into the postindustrial information age.

The model of the Center, not only represented another case in the trajectory from development to post development regimes, but also a particular conceptualization of international economic relations. Servan-Schreiber notion of informatics as a field of a dispute between the economies of France, United States and Japan, is what Ankie Hoogvert characterizes as the realist position in Political Economy. Hoogvert states that this position "gives primacy to the body politic, conceives the nation-state as actor, and imagines the world as a competition of units in an anarchic international arena dominated by the struggle for power among states".<sup>20</sup> However, in practice, the Center started to receive funds from several sources, "with the fund-raising efforts concentrated in the Arab world".<sup>21</sup>

However, the prominence of the political aspect of these initiatives, labeled under a socialist effort of France to enter the economy of computing, shaped the critiques of local engineers and corporative representatives in Colombia. For example, the computer suppliers insisted on inquiring the government if their interest in the field of informatics was real or political.<sup>22</sup> After asking if media might be manipulated to bring an excellent image of the convulsed World Center, they declared that there was not a coherent plan for the management of informatics in the country. For them, the regulatory practices were filled with a lack of knowledge from the state officers of international commerce who cannot even distinguish between a terminal screen and a keyboard.

---

<sup>20</sup> Hoogvelt, *Globalization and the Postcolonial World : The New Political Economy of Development*.

<sup>21</sup> Echikson, "Microcomputer Center in Paris."

<sup>22</sup> El Tiempo. "Urge definir las reglas de juego".

For engineers, there was a crucial issue on correctly understanding what the world computer means. From an engineering perspective, even the process of importing such machines had to rely on a rational and planned sequence to counteract the chaotic import of computer technologies. While such preoccupation reflected their connection to global circuits of computational knowledge and the desire to push the country into the future.<sup>23</sup> Engineers shared a common fear, about the restrictions to computer's imports, because "the achieved technological level will diminish, and the massive diffusion of computers will be loss".<sup>24</sup>

In the context of developing countries, histories of technology, infrastructures accomplish a complex role of cultural significance. In this case, during a period of crisis, several governments decided to meet for creating a regional policy for the development of informatics sovereignty. Although they recognize that a new economic neoliberal spirit that drove computer market expansion, they realized that the most crucial fear was to remain at the margins of a new version of civilization<sup>25</sup>. For that reason, the greatest fear was remaining behind in the nation competition. As the Mexico Declaration in 1984 states:

"There is an aspect of informatics that, if we don't take urgent measure, is committed to becoming the reason for the deepest imbalance between peoples, that could ever existed and that could make humanity move back to a world structure corresponding to the image the Romans had of their world: Outside the Roman world, there were only barbarians".<sup>26</sup>

---

<sup>23</sup> Brian Larkin, "The Politics and Poetics of Infrastructure," *Annual review of anthropology* 42 (2013).

<sup>24</sup> El Tiempo. "Urge definir las reglas de juego"

<sup>25</sup> Oficina Intergubernamental para la Informatica, *Informe Final De La Reunión Regional De América Latina: Informática Y Soberanía : La Informática, Una Estrategia Para La Integración Regional* (Cali: Club de Cali, 1984).

<sup>26</sup> Ibid.

As stated by Brian Larkin the political address of infrastructure has represented "the possibility of being modern, of having a future or the foreclosing of that possibility and a resulting experience of abjection"<sup>27</sup>.

### **The disappointment of the Colombian Computer**

For the Colombian government, to promote informatics industry was not a blind effort. The state representatives argued that they were conducting feasibility studies for analyzing the potential market and other important aspects of his success or failure. The project was consistent and meditated that only could happen if the government trusted of his viability and success.<sup>28</sup> One option was the production of specific parts and peripherals. Such idea relied on an increasing business of electronic parts, most of them aimed to repair and maintenance of home appliances.<sup>29</sup> In fact, it was one of these business which also in 1984, introduced the prototype of the first "Colombian" computer.

The local company that presented the first Colombian computer was Diselec. Gonzalo Gomez Marin, an electrical engineer who owned an industry of stabilizers, voltage regulators and regulated sources, managed it. With other engineers, they develop the Discop-1, a prototype that echoed the aspirations of the government. For Gomez Marin, their invention was "to use what we have, sit in reality, and not to create a factory like Apple or another big producer with millions of dollars to invest".<sup>30</sup> Instead of spending efforts in research and development made years ago in other countries, he argued, we must turn to independent manufacturers to integrate the best for

---

<sup>27</sup> Larkin, "The Politics and Poetics of Infrastructure."

<sup>28</sup> El Tiempo. "Urge definir las reglas de juego".

<sup>29</sup> Adolfo Mora Villate, "La Industria Electronica Y Su Importancia Para La Economía Del País," *Ciencia, tecnología y desarrollo* 13, no. 1-4 (1989).

<sup>30</sup> El Tiempo. "Ni crear fabricas ni hacer diseños de micros". P.7-C. (June 6, 1984)

suiting our environment at the lowest possible cost". The project reached media attention to the computer section editor of "El Tiempo, and as such it serve for the discussion of computer manufacturing in Colombia.<sup>31</sup>

For Edgar Valero Julio this story represented the "dissapointment of the Colombian computer"<sup>32</sup>. He explained that in the middle of the eighties, the Colombian economy incorporated a notable number of computers, especially microcomputers. According to Valero DISCOP producers "enthusiastically presented arguments to venture in that field, with the possibility of emulating developments like in Korea".<sup>33</sup> Among the reasons, as stated in *El Tiempo* article, were low cost in production, cheap labor, the advantage of accumulated experience in support equipment, association with European producers, and program of technology transfer. Finally, the main argument was that the State should apply laws to encourage the use of equipment in their offices.<sup>34</sup>

---

<sup>31</sup> El Tiempo "Colombia hacia una produccion nacional", (February 20, 1984) p. 14-B ; El Tiempo "Fabricacion de micros en Colombia. Un mito?", (May 14, 1984) p.14-B

<sup>32</sup> Edgar Augusto Valero Julio, "La Informática En La Industria Colombiana: Vicisitudes En La Difusión De Una Tecnología. 1958-1990," *Revista EAN*, no. 38 (1999).

<sup>33</sup> Ibid.

<sup>34</sup> El Tiempo. "Fabricacion de micros en Colombia. Un mito?".



Figure 1. The editor of the Computer Section surrounded by the engineers who designed de DISCOP-1, the first Colombian computer.

Several experts expressed their skepticism, suggesting producing to computer peripherals, less elaborated and exigent in research than computers. As the production of semiconductors, was out of reach of local electronics industry, it “had just begun its development, with a small companies sector that produced digital leds, alarms, temporizers, voltage regulators and stabilizers, telecommunication equipment, and entertainment electronics.” (Valero Julio, 1999) This emergent business, however, remained very significant as a mediator of the implementation of digital technologies, especially, as I mentioned before, with home appliances. To support the advent of microcomputers, a new set of industries of repair and maintenance, created from protective covers to furniture for offices. Moreover, partial access to these technologies developed in a minor scale, processes of inverse engineering. In the case of countries like Taiwan, hacking emerged as a central practice for the production of computers. (Tinn, 2013)

On February 20, DISCOP published in *El Tiempo* an article entitled “Colombia towards a national production”. In this article, they describe a present-day scenario where Colombia could produce computers.<sup>35</sup> The editor of the section, Guillermo Santos Calderon was invited to a demo of the elaboration process of this national machine. In the interview, Santos Calderon asked Gomez Marin about cost and quality control. Santos highlighted that the procedure of making the Discop-1 was strictly handmade, with a “simplicity that clashes with what is considered a computer factory”. Moreover, through a series of photos of the assemblage process, he described the process as rudimentary. Santos Calderon earned his degree in Computer and Systems Engineering at the Universidad de Los Andes, the first Colombian university to create an undergraduate program in the field.<sup>36</sup> After he graduated, and as member of the Snatos family that own *El Tiempo* Newspaper, he create the Computers section to move academic and professional debates from professional publications to a broader audience.

---

<sup>35</sup> El Tiempo “Colombia hacia una produccion nacional”

<sup>36</sup> Prieto Ñañez, *Ingeniería De Sistemas Y Computación, 1968-2010 : Los Pequeños Números Que Hemos Visto Cambiar*.

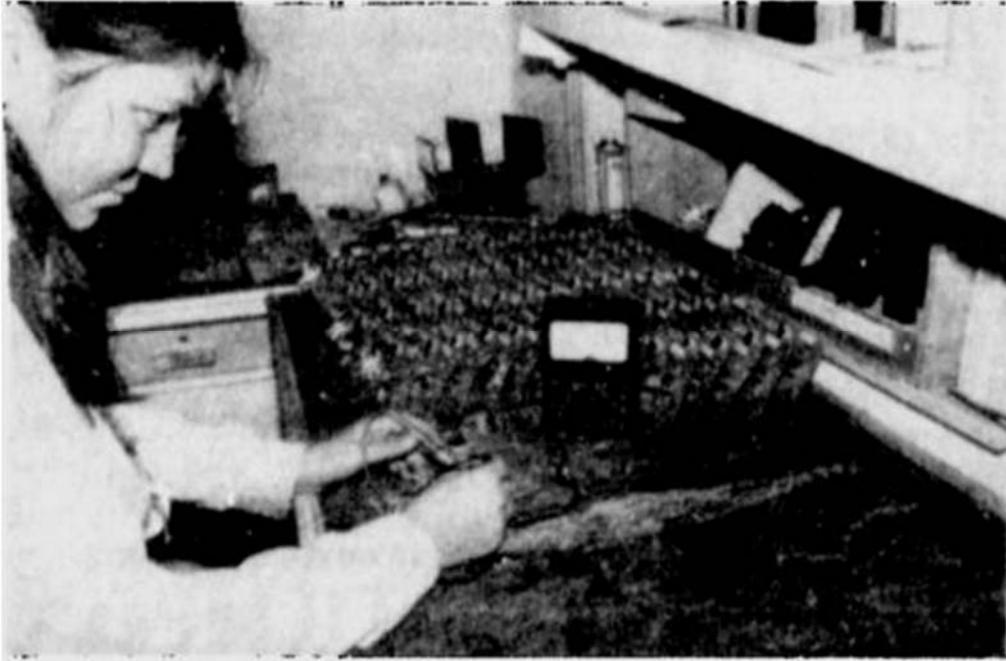


Figure 2. A woman assembling the DISCOP-1.

A considerable number of commenters and columnist also had the systems engineering degree from Universidad de los Andes. It was the case of Alfredo Amore, one of the first systems engineers, graduated from that program.<sup>37</sup> In a letter to the editor, he criticized that DISELEC wanted to move from producing voltage regulators to computers. He pointed that the fact of manufacturing or assembling computers in the country had the advantages of attracting labor. However, he considered that for being competitive in the computer industry it was necessary to use robots for their production as it was happening in developed countries. He also criticized the ideas of autonomy and local design, as he considers the absurd of manufacturing a typewriter or a telephone center adapted to the needs of the country. Amore discourages manufacturing computer in Colombia because that would make the country more dependent, as users should use only

---

<sup>37</sup> El Tiempo “Correo Electronico” (February 20, 1984).

Colombian computers to protect the national industry. As an example, he asked if a person in Colombia would buy a computer made in Argentina, Chile or Peru.

The large-scale corporation represented the ideal of modern economic progress while entrepreneurs and small firms looked archaic and destined to disappear. As stated by AnnaLee Saxenian “entrepreneurship largely disappeared from scholarly and policy debates in the postwar period”<sup>38</sup>. As recent as the 1980’s, the consensus was that the large mass-production corporation represented the optimal way to organize production.” The import substitution model that characterized Latin America since the 1950’s allowed the emergence of local businesses attached to national identity. But in the field of computer and telecommunication technologies, corporations like IBM, Burroughs, and Digital, established their branches in an expansionist strategy that started before World War II. In this debate, firms pushed the government to consider their policies, regarding the number of employees that should lose their jobs, especially after they have invested lots of money in maintenance or software support engineers.<sup>39</sup>

However, companies like DISELEC started in the context of the expansion of the cities and increasing levels of consumption. Several local businesses from video rentals to taxi services, became histories of success during those years.<sup>40</sup> As historian David Bushnell shows, the eighties was a period when the “clase emergente (emerging class), made up of people who had risen rapidly in economic status, not necessarily through legitimate means. Although the formal industry experienced the great recession, “the "informal" sector of unregistered small firms and individual workers taking piecework to do at home correspondingly expanded.”<sup>41</sup> Bushnell remarks how

---

<sup>38</sup> AnnaLee Saxenian, *The New Argonauts : Regional Advantage in a Global Economy* (Cambridge, Mass.: Harvard University Press, 2006).

<sup>39</sup> El Tiempo (May 28, 1984). *Op. Cit.*

<sup>40</sup> Hollmann Morales, *A Puro Pulso* (Santafé de Bogotá, Colombia: Círculo de Lectores, 1996).

<sup>41</sup> Bushnell, *The Making of Modern Colombia : A Nation in Spite of Itself*.

scholars and casual observers often failed to notice how population itself was changing in ways not always readily susceptible to political or economic analysis. In the writing of the history of entrepreneurship, Colombians must confront the tension between legality and illegality that crossed the rise of this emergent class during the eighties.

### **The grammar of technology use**

On June 27, Jorge Phillips, chief of technology for the government and writer in the computer section of *El Tiempo*, published an article entitled, “the future of computation in Colombia”.<sup>42</sup> He began his text by talking about the passive way that Colombians assume change. The future, he argued, do not arrive, but "it is constructed here". Phillips, a Colombian computer scientist who finished his Ph.D. at Stanford University, came to Colombia for leading the program of Computing and Systems Engineering at Universidad Los Andes.<sup>43</sup> After three years, Belisario Betancur asked him to join the office of technology at the Colombian Presidency. His ideas aligned with those of the World Center of Informatics and Human Resources. For Philips,

"The primary industry at the end of the century will be knowledge industry, that is to say, the production of logic to resolve problems in several domains. [...] This industry is intensive in people and not in capital, and for that reason, it is ideal for countries with high intellectual potential and developing traditional economies, like Colombia”.<sup>44</sup>

---

<sup>42</sup> El Tiempo “El Futuro de la Computacion en Colombia”. (May 7, 1984)

<sup>43</sup> Prieto Ñañez, *Ingeniería De Sistemas Y Computación, 1968-2010 : Los Pequeños Números Que Hemos Visto Cambiar*.

<sup>44</sup> *Ibid.*

His argument favored software from hardware. He envisioned a future where instead "on of telling the machine "how" a program is resolved in detail, to tell the machine "what" is the problem to be solved."

Articles and letters published in *El Tiempo*, showed how expert knowledge, embodied in system engineers, offered a window to the increasing interest of informatics in Colombia. The debates around the government politics and the possibility of producing local computers, displayed also news from international sources. The articles in this section showed informatics innovations in a futurist scenario that highlighted the advantages of deploying these technologies.<sup>45</sup> This process of popularization of computer knowledge also took part in computer fairs, which started as a call for experts, but quickly became popular. After its first version in 1983, the CompuExpo not only included computer exhibition, but also conferences for businessmen, executives and students. Alfredo Amore, stated that "one of the goals of Compuexpo is to convince incredulous that although with computers people can make errors, and even fraud, their immediate benefits and advantages, leave behind any doubt about if that change happens today or tomorrow".<sup>46</sup>

The demands of new experts in offices launched the offer of educational programs. According to the article "Where and what you can study in Systems?" published in April 9, what Colombia needed was programmers, analyst, and planners. In this field, the article explains, "more than the level of studies, what counts is the experience, the skills, and the capacity to assimilate the work in their distinct branches".<sup>47</sup> However, the distinction in three levels corresponded with distinction between levels of higher education institutions.. In 1984, based on a report of the Colombian

---

<sup>45</sup> Steve Woolgar, "Configuring the User: The Case of Usability Trials," in *A Sociology of Monsters: Essays on Power, Technology, and Domination.*, ed. John Law (London: Routledge, 1991).

<sup>46</sup> El Tiempo "Ingenieros urgen sistematizar empresas." (April 9, 1984).

<sup>47</sup> El Tiempo (April 9, 1984) "Donde y que se puede estudiar en Sistemas?"

Institute for the development of Higher Education (ICFES) established that 27 programs offered titles in the field of Systems and computation. The Institute divided the programs into three areas, the intermediate professional formation and technological programs, and College degrees. According to the statistics from the article, while, at the level of Intermediate professional formation and technology, there were 4356 students, at the College level there was 6.111 students. The social status of becoming an engineer surpassed the access to this field in the technical level, a situation that still concern government plans for developing informatics industry.

However, the participation of young people caught the attention of the journalist who covered the events at Compuexpo. The great affluence of young showed them how the work of informatics was being easily assimilated by Colombian youth.” That was more evident in College programming marathon, a contest based on the International Collegiate Programming Contest hosted by the Association for Computer Machinery.<sup>48</sup> During ICPC competitions, teams of three university students compete to solve as many challenging programming problems as they can within 5 hours. The Colombian version focused on algorithmic programming, especially with logic approaches to software design. This specific approach to programming, characterized the learning approaches in the different levels of computing high education, where scientific programming was embraced by universities and engineering departments, while programming using “tricks” as some engineers denominate empirical learning, was popular in other spaces.<sup>49</sup>

The fear of the deterioration of the informatics infrastructure, show local engineers and computer suppliers an opportunity not in hardware but in software production. At the end of 1984, the government established a committee to develop a plan for software industry and the protection

---

<sup>48</sup> ICPC (2015) “international College Programming Contest - History” retrieved from <http://icpc.baylor.edu/community/history>

<sup>49</sup> El Tiempo (May 28, 1984). Op.Cit.

of copyright.<sup>50</sup> As Wendy Chun (2011) states, “Legal battles over software copyrights and patents make clear the stakes of this transformation of software from a service, priced per instruction, to a thing”. The plea for copyright was based in the “excessive” number of programs copies. As soon as 1984, the computers suppliers declared, “in Colombia lots of programs are copied. If the government want to give a serious drive to software industry, it must start for avoiding that the final product, could be easily stolen and market in pirate manner.”<sup>51</sup> By this year, informal commercial networks in Colombia incorporated computer parts and software in their network of commodities, following a global trend, that posed “great challenges for the state, expanding media industries and capitalist corporations”<sup>52</sup>

Interestingly, issues of copyright infringement shaped not only local technological designs and methods, but also reinforced the location of innovation through the expansion of intellectual property. In November 1985, Unitron, a Brazilian company, began the development of the MAC 512, nicknamed as the “Mac of the periphery”. The Special Secretary of Informatics in Brazil approved the development of this computer, as it used techniques of reverse engineering. The technic of reverse engineering replicated the functional features of a computer system without exactly copying it.<sup>53</sup> However, a few years later, under a huge Apple’s campaign to expand the defense of copyright at a global level, the project was turned down. Even tough the Mac of the Periphery did not violate Apple’s rights in Brazil, the government of the United States built up

---

<sup>50</sup> F Jordan Flórez, "La Industria De Software : Políticas Y Reglamentaciones," (Bogotá: Universidad Piloto de Colombia, 1985).

<sup>51</sup> El Tiempo (May 28, 1984). *Op.Cit.*

<sup>52</sup> Ravi Sundaram, *Pirate Modernity : Delhi's Media Urbanism* (London ; New York: Routledge, 2009).

<sup>53</sup> Ivan da Costa Marques, "Cloning Computers: From Rights of Possession to Rights of Creation," *Science as Culture* 14, no. 2 (2005).

political and commercial pressures, at the point of threatened to impose commercial barriers on exports from Brazil to the US.

Legal battles also emerged in In Taiwan from 1980 to 1984. Honghong Tinn showed a complex set of knowledge practices that move between the boundaries of legality, where local tinkers started to modify Apple computer's design.. Moreover, she showed how this boundary emerged from Taiwanese actors' perceptions of the status of a "developing" country and its relation to technology. As stated by Tinn "The relationship between technological choices and conceptions of society is not an unusual theme in historical studies of technology. In fact, such an interplay of ideas about development and technology is common in postcolonial countries".<sup>54</sup>

For that reason, to follow these design practices in the context of the reinforcement of copyright is also to involve a series of conditions that make it possible. In the case that follows, uneven economic relations, with consequences for legal and cultural power, shape what counts as legitimate design practice.<sup>55</sup> The network of small electronics has been considered residual, and knowledge practices around technology have been considered deviant from valid interpretations of design work, innovation, and creativity.<sup>56</sup> In Brazil, as stated by Ivan da Costa Marques" the position of Brazilian computer professionals of the 1970s resonated with the tradition of a well-known cultural movement in Brazil".<sup>57</sup> Moreover, In Taiwan, although designers as early users

---

<sup>54</sup> Honghong Tinn, "From Diy Computers to Illegal Copies: The Controversy over Tinkering with Microcomputers in Taiwan, 1980-1984," *IEEE Annals of the History of Computing* 33, no. 2 (2011).

<sup>55</sup> L. Irani et al., "Postcolonial Computing: A Lens on Design and Development," *Conf Hum Fact Comput Syst Proc Conference on Human Factors in Computing Systems - Proceedings 2* (2010).

<sup>56</sup> Ibid.

<sup>57</sup> Marques, "Cloning Computers: From Rights of Possession to Rights of Creation."

possessed expertise in modifying technology, in fields like electronics or electricity, hobbyists and amateurs might obtain necessary expertise through informal channels or personal networks.<sup>58</sup>

**Conclusion: Global aspirations and the engineering work of imagination.**

In 1984, the introduction of the Apple II computer fascinated Colombian engineers. Enrique Santos Calderon went to Puerto Rico to view a demo of this machine. In this presentation, in January 24, the company announced their politics of marketing for the Caribbean and South America. Compared to the language he use for describe the Colombian Computer, Santos Calderon congratulate the Apple representative, not only for promoting its product, but also, “for involve Colombia in pilot plans that just can leave invaluable experiences in informatics area”.<sup>59</sup> Business opportunities between Bogota and Miami, expanded during this decade between legal and illegal economy exchanges.

In the case of the engineers that embraced the dissemination of personal computers, they were in the middle of a process of transformation in their commitment with the nation. As stated by Lucena “ globalization and liberalization of markets, including engineering labor, and privatization of state enterprises pose new challenges to engineers’ identities.”<sup>60</sup> Although engineers from private universities moved from state institutions to multinational firms, they remained as the experts on "proper" ways to use technology. Moreover, their visions of technological future for Colombia, as expressed during the 1980’s could be understood both as an aesthetic as well as a

---

<sup>58</sup> Tinn, "From Diy Computers to Illegal Copies: The Controversy over Tinkering with Microcomputers in Taiwan, 1980-1984."

<sup>59</sup> El Tiempo. “Caballo de batalla de Apple para 1984”. (February 6, 1984).

<sup>60</sup> Juan C. Lucena, ""De Criollos a Mexicanos" : Engineers' Identity and the Construction of Mexico," *History and technology*. 23 (2007).

political project. Local Computer and Systems engineers used newspapers and exhibitions to modulate the desirable technological future for the country

This horizon of aspirations follows what Appadurai calls “the work of the imagination” which is characterized by the way in which humans "extend their chances of survival, improve their horizons of possibility, and increase their wealth and security".<sup>61</sup> To follow the practicalities of this work, however, will not only rely on describing the current situation, but also on linking them with a genealogy of technological uses in Colombia, that is, to stress the historical inheritances of infrastructures. For that reason, this local version of the information society was constructed along historical lines that connect development, local politics, urbanization process and a postcolonial flow of cultural objects.

As new narrations of Colombia's history travel in networks of global investment, these legacies are underrepresented in favor of the new ideal of technological future. In this paper, I proposed an archival revision to the cultural links between entrepreneurship and technology, to establish connections with current calls for innovation into a post development scenario. The decade of 80's characterized a decade of social and economic experiments in America Latina. Alvarez, Escobar and Dagnino, recognized the double nature of globalization and neoliberalism in Latin America, as they focused on the introduction of new forms of self-objectification, identity formation, and discipline, enhanced by neoliberal programs.<sup>62</sup> Moreover, the historical legacies of colonialism, and the lettered practices that shaped cities in Latin American, through the symbolic order installed with writing. As Angel Rama stated

---

<sup>61</sup> Arjun Appadurai, "How Histories Make Geographies," *Transcultural Studies*, no. 1 (2010).

<sup>62</sup> Sonia E. Alvarez, Arturo Escobar, and Evelina Dagnino, *Cultures of Politics, Politics of Cultures : Re-Visioning Latin American Social Movements* (Boulder, Colo.: Westview Press, 1998).

One could say that the America continent became the experimental field for the formulation of a new Baroque culture. The first methodical application of Baroque ideas was carried out by absolute monarchies in their New World empires, applying rigid principles – abstraction, rationalization, and systematization – and opposing all local expressions of particularity, imagination, or invention”.<sup>63</sup>

The study of this symbolic order, rooted in the practices and materialities of paperwork can extend the genealogies of computing to a broader set of practices, those neglected by engineers, where power and knowledge about computing encountered the infrastructure of the lettered city.

## Reference List

- Alvarez, Sonia E., Arturo Escobar, and Evelina Dagnino. *Cultures of Politics, Politics of Cultures : Re-Visioning Latin American Social Movements*. Boulder, Colo.: Westview Press, 1998.
- Anderson, Warwick. "Introduction: Postcolonial Technoscience." *Social Studies of Science* 32, no. 5/6 (2002): 643-58.
- Appadurai, Arjun. "How Histories Make Geographies." *Transcultural Studies*, no. 1 (2010-10-19 2010): 10.
- Bushnell, David. *The Making of Modern Colombia : A Nation in Spite of Itself*. Berkeley: Univ. of California Press, 1993.
- Chakrabarty, Dipesh. *Provincializing Europe : Postcolonial Thought and Historical Difference*. Princeton Studies in Culture/Power/History. Princeton, N.J.: Princeton University Press, 2000.
- Echikson, William. "Microcomputer Center in Paris." *The Christian Science Monitor*, June 2 1982.
- Ensmenger, N. "Computation, Materiality, and the Global Environment." *IEEE Annals of the History of Computing* 35, no. 3 (2013): 80-80.
- Hoogvelt, Ankie M. M. *Globalization and the Postcolonial World : The New Political Economy of Development*. 2nd ed. Baltimore, MD: Johns Hopkins University Press, 2001.
- Irani, L., J. Vertesi, P. Dourish, K. Philip, R. E. Grinter, and C. H. I. th Annual Chi Conference on Human Factors in Computing Systems. "Postcolonial Computing: A Lens on Design and Development." [In English]. *Conf Hum Fact Comput Syst Proc Conference on Human Factors in Computing Systems - Proceedings 2* (2010): 1311-20.

---

<sup>63</sup> Angel Rama, *The Lettered City*, trans. John Charles Chasteen, Post-Contemporary Interventions (Durham, NC: Duke University Press, 1996).

- Jasanoff, Sheila. *States of Knowledge : The Co-Production of Science and Social Order*. International Library of Sociology. London ; New York: Routledge, 2004.
- Jordan Flórez, F. "La Industria De Software : Políticas Y Reglamentaciones." Bogotá: Universidad Piloto de Colombia, 1985.
- Larkin, Brian. "The Politics and Poetics of Infrastructure." [In English]. *Annual review of anthropology* 42 (2013): 327-43.
- Lucena, Juan C. ""De Criollos a Mexicanos" : Engineers' Identity and the Construction of Mexico." [In English]. *History and technology*. 23 (2007).
- Marques, Ivan da Costa. "Cloning Computers: From Rights of Possession to Rights of Creation." [In English]. *Science as Culture* 14, no. 2 (2005): 139-60.
- Mitchell, Timothy. *Rule of Experts : Egypt, Techno-Politics, Modernity*. Berkeley: University of California Press, 2002.
- Mora Villate, Adolfo. "La Industria Electronica Y Su Importancia Para La Economía Del País." *Ciencia, tecnología y desarrollo* 13, no. 1-4 (1989): 91-104.
- Morales, Hollmann. *A Puro Pulso*. Santafé de Bogotá, Colombia: Círculo de Lectores, 1996.
- Oficina Intergubernamental para la Informática. *Informe Final De La Reunión Regional De América Latina: Informática Y Soberanía : La Informática, Una Estrategia Para La Integración Regional*. Cali: Club de Cali, 1984.
- Philip, Kavita, Lilly Irani, and Paul Dourish. "Postcolonial Computing: A Tactical Survey." *Science, Technology & Human Values* (2010).
- Prasad, Amit. "Science in Motion: What Postcolonial Science Studies Can Offer." [In No Linguistic Content]. *Electronic Journal of Communication Information & Innovation in Health (RECHIS)* 2, no. 2 (2008): 187/244.
- Pratt, Mary Louise. *Imperial Eyes : Travel Writing and Transculturation*. London ; New York: Routledge, 1992.
- Prieto Ñañez, Fabián Mauricio. *Ingeniería De Sistemas Y Computación, 1968-2010 : Los Pequeños Números Que Hemos Visto Cambiar*. Bogotá: Ediciones Uniandes, 2015.
- Rama, Angel. *The Lettered City*. Translated by John Charles Chasteen. Post-Contemporary Interventions. Durham, NC: Duke University Press, 1996.
- Saxenian, AnnaLee. *The New Argonauts : Regional Advantage in a Global Economy*. Cambridge, Mass.: Harvard University Press, 2006.
- Servan-Schreiber, Jean Jacques. *The World Challenge*. New York: Simon and Schuster, 1981.
- Sundaram, Ravi. *Pirate Modernity : Delhi's Media Urbanism*. London ; New York: Routledge, 2009.
- Tinn, Honghong. "From Diy Computers to Illegal Copies: The Controversy over Tinkering with Microcomputers in Taiwan, 1980-1984." *IEEE Annals of the History of Computing* 33, no. 2 (2011): 75-88.
- Valero Julio, Edgar Augusto. "La Informática En La Industria Colombiana: Vicisitudes En La Difusión De Una Tecnología. 1958-1990." *Revista EAN*, no. 38 (1999): 79-96.
- Woolgar, Steve. "Configuring the User: The Case of Usability Trials." In *A Sociology of Monsters: Essays on Power, Technology, and Domination.*, edited by John Law. London: Routledge, 1991.