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Title of the paper

**DYNAMICS OF CLIMATE POWERS: POLITICAL AND
ECONOMIC INSTITUTIONS IN KEY COUNTRIES OF THE
CARBON CYCLE**

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ABSTRACT

The study analyzes the international system to provide a framework on the influence of the political and economic institutions quality for public policy management of solid waste, as a climate change policy confronting. Such research reports, on aspects of historical and institutional training of the key-countries in the carbon cycle, conclude a causal impact: countries that have failed in their public policies, in the field of solid waste management, were those who built political extractive economic institutions, which are structured to the elite extract resources from many, unlike the inclusive institutions, which are characterized by a pluralistic and democratic society.

Keywords: Public Policies, Political and Economic Institutions, Democracy, Climate changes, Solid Waste.

RESUMEN

El estudio analiza la evolución del sistema internacional para presentarse la influencia de la calidad de las instituciones políticas y económicas en la gestión de los residuos sólidos frente al cambio climático. Tales informes sobre los aspectos de la formación histórica e institucional de los países clave en el ciclo del carbono concluyen: los países que han fracasado en sus políticas públicas en la gestión de residuos sólidos, fueron los que construyeron las instituciones políticas extractiva económica, que están estructurados de manera que la élite puede extraer, diferente de las inclusivas, que se caracterizan por una sociedad plural y democrática.

Palabras clave: Políticas Públicas, Instituciones Políticas y Económicas, Democracia, Cambio climático, Residuos Sólidos.

I. INTRODUCCION

The intention of this research is to analyze the influence of the political and economic institutions in public policy management of solid waste, as a confronting climate change policy. Evaluations of public policies regarding the waste management field are generally associated to geographical, historical, cultural, ethnical and technocratic issues, which do not cease to be a common sense. These variables, however, are only part of the explanation. The study brings the hypothesis that countries that have failed in their public policies, in the field of solid waste management, were those who built political and economic extractive institutions (ACEMOGLU, ROBINSON, 2012), structured so that a predatory elite (MILLS , 1982) could extract resources from many, unlikely the inclusive institutions (ACEMOGLU, ROBINSON, 2012) which spread among society the notion of empowerment, here understood as the existence of opportunities (freedom) in the expansion of human capabilities (SEN, 2000), aimed to overcome social and economic dependency and political domination.

The study condone the point of view of some authors, such as Kehoane, Roustianla, Victor, Nye, Verba and King, whose structure and system processes to be governed have characteristics such as the rise of emerging countries, the economic crisis and the climate problem, which boosted the construction of the current international system of conservative hegemony (VIOLA et al., 2013.), concept that reflects on the inaction and impotence of part of powers in global governance structures. This structure refers to the distribution of power and the process concerning the type of interaction among units. In this regard, the evaluation criteria of both the structure and the agent refer to the commitment to global governance, particularly to the degree of climate commitment (VIOLA, et al. 2013).

The mentioned criterion proposed on the system structure analysis and on the examining process does not imply a total break with the category of hegemony of democracies, it only shows that this category is insufficient to analyze the causes and effects of climate changes regarding the global development process. For practical purposes, the study has followed the methods of the authors Ruth Berins Collier and David Collier (1991), concerning two components: 1) generation and evaluation of the hypothesis of the research through the

similarities and differences in the use of political power by elites in different climatic powers and 2) the "tracing process" procedure over time, whereby the explanations can be empirically verified in detail.

II. DYNAMICS OF CLIMATE POWER

The concept of power for the purpose of this work is given as any state actor that has a certain level of capacity and willingness to build the governance of the international system. As a corollary of this reasoning, climate power would therefore be the possession of power resources (military capacity and economic power) and climate commitment, that lies in the combination of three elements: participation in global emissions, possession of human and technological resources to the decarbonization of global economy and the energy behavior (VIOLA, et al., 2013).

This new international system analysis approach (using the concept of climate power), is a breakthrough in the static view of concepts that addresses the comprehensive international climate regime, which are unable to offer explanatory tools for new movement on global climate politics (VIOLA et al., 2013). It focuses on the dynamics of state actors, the economy, population, natural resources, carbon emissions, and scientific, technological, and human capital for decarbonization.

In first level, it would be the superpowers: USA, China and the European Union, which together account for 55% of global GDP and 47% of global carbon emissions (VIOLA et al., 2013). Three characteristics are relevant to the superpowers: high proportion of global carbon emissions, technological and human capital for decarbonization and power of veto over international agreements. The second level would be the great powers: Russia, India, Japan, South Korea and Brazil, which together concentrate 20% of global GDP and 20% of emissions (VIOLA et al., 2013). In the third level are the middle powers: Chile, South Africa, Saudi Arabia, Argentina, Australia, Bangladesh, Canada, Singapore, Colombia, Egypt, United Arab Emirates, the Philippines, Indonesia, Iran, Israel, Malaysia, Mexico, Nigeria, Norway, Pakistan, Switzerland, Thailand, Taiwan, Turkey, Ukraine, Venezuela, and Vietnam.

Based on this categorization of climate power, the study has comparatively analyzed solid waste management strategies by coping climate change policies. Analyzing the development of solid waste management models, two models were evaluated: command and control policy (rules and standards) and economic instruments (price, fees and subsidies).

The following is the empirical application of these criteria in eight countries (USA, China, Russia, India, Japan, South Korea, Brazil and Chile) and in the European Union, which combined concentrate 75% of global GDP and 67% of global emissions. This group of countries is classified as the intersection of variable power (medium, large and super) with variable political regime (authoritarian, semi-democracy, low-quality democracy, authoritarian with some climate commitment, average quality of democracy and high quality democracy).

III. SUPERPOWERS: THE USA, THE EUROPEAN UNION, AND CHINA

United States in the political economy of climate change

With a population of 313 million people, the \$ 18.1 trillion GDP of the United States results in a \$ 55,000 GDP per capita (IMF, 2015). Having one of the largest expenditure in arms in the world (\$ 610 billion - 3.5% of GDP – according to SIPRI YEARBOOK, 2014), the United States is also the world's largest waste producer with almost 2 kg of solid waste per person per day or 800.9×10^3 t / day (U.S, 2010). The country throws away the body weight of an average adult, each month. Despite reduction on a gradual amount of solid waste sent for disposal and final disposal (landfill or incineration) and a decrease of 6.92% in the generation of GHGs from the waste between the years 1990 and 2011 (WRI, 2015), the US still have high carbon intensity per unit of GDP, 0.5 tons of carbon per 1,000 of GDP, with 25 tons per capita, which corresponds to 15% of total global emissions (VIOLA, et al., 2013).

The summary of the history of the United States shows how each state regulates and governs its society. As a result of inclusive institutions, the United States edit solid waste laws since 1965 (U.S. EPA, 2008). Each company works with a set of economic rules and policies established by the State and the citizens. In other words, it is the political institutions that establish and operate a solid waste management. In the United States, until the 1990s,

recycling took place outside the jurisdiction of waste management. Increasing the average vulnerability to the effects of climate disruption and because of the great difficulty in finding places to build landfills or incinerators in the following decades, economic institutions have received incentives to innovate and adopt new technologies to meet the challenges in the management of solid waste. It is estimated that 2.6% of US GDP are directed to research and development (R & D) (VIOLA, et al., 2013).

Moderate conservative power in the transition to a low carbon economy, recycling is a public priority of the United States, and political institutions in the State of New York, as an example, dictate which economic institutions the country will have. Even with its 10 million inhabitants and daily disposal of 24,000 tons of waste, approximately 1.8 kg per person, New York has ceased to be the capital of solid waste on the planet (Brown, 2013). With the emergence of a number of new generating economic incentive institutions to implement the legal framework constructed for the management of solid waste, the Fresh Kills landfill closure, the largest in the planet, in New York, was only possible in 2001.

Despite the increased environmental concern of Americans, it is worth noting the internal division between progressives and conservatives due to the climate change regime. Conservative forces are usually sponsored by average oil companies, utilities and power plants of the automotive industry (except Ford). As reformers examples, New England and California have increased energy efficiency, productive, technological processes, low carbon logistics and recycling of various materials. Among the various structural and cyclical elements, the decarbonization of the United States is committed by "sectoral lobbies, public debt, employment crisis, pro-fossil energy culture, governability crisis, etc." (VIOLA et al., 2013).

European Union in the political economy of climate change

The European Union, composed by 28 European countries, radicalizes the conservative stance of the United States. With a population of 710 million, corresponding to 10.8% of the world population, a GDP of \$ 18 trillion and a GDP per capita of \$ 36,700 (IMF, 2014), the EU emits 5.7 billion tons of carbon, equivalent to 11% of the world total (VIOLA et al., 2013). EU actions to mitigate the effects of climate change have been reforming, which results in

reducing GHG emission rates for waste, which in the past two decades has decreased, 32.43%, between 1990 and 2011 (WRI , 2015).

As for the generation of MSW, the European Union is 811, 2x 10³ t/day, resulting in a per capita rate of 1.615 kg/person/day in the 33 member countries of the European Environment Agency (2012). The answer that each member of the European Union gives the solid waste management system determines of which systems do not work and which ones thrive. Why does the environmental management system work in most Western European countries and fails in Eastern European countries? Even with the Black Death, in 1346, in European countries, both in the West and in the East sides, the relations have obeyed the feudal hierarchies: a king owned the land which was allocated and peasants remained stuck to it.

After the Black Death, in the turn of the fifteenth century, feudalism has languished, and its effects have differently reached the political and economic institutions of Western and Eastern Europe. While in the Western part of Europe the state was strong, centralized and workers were free of feudal regulations in Eastern Europe the nobles increased taxes collected and seizing half of the production. A critical moment, as occurred in Europe, can pave the way for a cycle of extractive institutions and more inclusive possibilities, as in the cradle of the industrial revolution in England (ACEMOGLU, ROBINSON, 2012).

Unprecedented in history, the state as we know nowadays has emerged in the seventeenth century in Western Europe, in England, to ensure law and order, enabling the expansion and business investment in sanitation, for example. Towards inclusive institutions, the Glorious Revolution, of 1688, was an important factor in the Western European countries because it cast its pluralistic institution policies bases, which enabled there, today, among the European countries, more converging interests divergent in solving some debate as free trade, the safety of air and maritime transport, defense against terrorism, the investment flow, the defense of the environment, the management of solid waste, among others.

With the 2008 crisis, the US have lost the lead in climate governance process, which hindered the European Union of achieving ambitious goals, in 2020: 50% of reuse and recycling household waste and 70% for waste construction and demolition. The erosion of European ability to lead the transition to a low carbon economy proves that climate change may lead to

a shift towards the extractive institutions, since in these countries there are political liberals, conservatives, neo-liberals, statesmen, anti-globalists, social democrats and green forming two subgroups (liberals and liberal statesmen).

China in the political economy of climate change

China has 21% of world population, 1.5 billion people, and a GDP of \$ 11.3 trillion and a GDP per capita of \$ 8,400 (IMF, 2015). Sending 8 tons of carbon per capita per year into the atmosphere, 10.9 billion tons of carbon in total, corresponding to 21% of global emissions, China has increased its emissions by 41.38% of GHGs from the waste sector (WRI, 2015), becoming the first nation in waste generation in 2012, jumping from 212 million tons, in 1980 (WORLD BANK, 2005) to 520 million tons of waste, in 2004. It is estimated that by 2025 China will produce 1.4 billion tons of waste (World Bank, 2014).

In the twenty-first century, China has economically surpassed the Japanese power, becoming the second largest economy in the world. Over the past 30 years, there have been radical reforms in Mao's China, expanding its degree of inclusion. However, despite progress towards inclusive economic institutions, China is an authoritarian regime, an example of growth on extractive institutions, centralized in a single party: the Communist Party. The labor mobility is controlled, there are virtually no property rights, the people and the media (internet) have little political freedom and to have necessary profitability to support the party.

In 1500, the standard way of living in China was similar to the Europeans. The heads (emperors, kings, rulers) of both places were opposed to changes through creative destruction (ACEMOGLU, ROBINSON, 2012). With the expansion of international trade, China, unlike Europe, has monopolized overseas trade, closing at its own navel. The consequence of economic control was the stagnation of innovation and commercial and industrial prosperity, making China become, in 1949, one of the poorest nations of the world. After the demonstrations in Tiananmen Square, it was believed that economic opening would lead to democracy. But increasingly the state has control over economic institutions. So why does China grow?

It grows because the extractive economic institutions abandon to meet a delay in the standard of living of the Chinese population, which is now a fraction of the per capita income \$ 48,000. (ACEMOGLU, ROBINSON, 2012). Delay that can be seen in increased productivity, trade, the new consumption habits and urbanization process, especially in cities like Beijing, Shanghai, Guangzhou and Shenzhen, which together produce 30,000 tons of garbage every day, which 50% ends up in landfills (ZHANG, DQ; TAN SK; GERSBERG RM, 2013).

Within the Chinese Communist Party, voices like the Prime Minister Wen Jiabao recognize the dangers of the effects of climate changes if the State does not carry out political reforms, especially in areas exposed to extreme risks. While China has authoritarian extractive political institutions and neglect high climate vulnerability, the government have approved the National Plan on Climate Change and an anti-crisis package, in 2008, with a ratio of 35% of targeted public spending to a low carbon economy. For the supporters of modernization theory of Seymour Martin (1959) the elements that appear in the ongoing process of modernization in Chinese society will be ultimately for democracy, for example, inclusive institutions are by-products of the growth process.

These new challenges and efforts of the Chinese reformist elite, post-2008, in the sense of global responsibility, can also be explained because those who control the institutions know if there are specific reforms the system may corrode. Among the post-2008 reform measures, the Ministry of Environmental Protection (MEP) was created replacing the State Environmental Protection Administration (SEPA), created in 1998 after a year of severe flooding. The Ministry of Environmental Protection holds the responsibility of regulating the quality of water, air quality, solid waste, soil, noise, and radioactivity. Municipal environmental agencies are subordinate to the Ministry of Environmental Protection and they are responsible for monitoring the environmental laws, with regard to the formation of consortia, collection, transportation, treatment and disposal of waste.

According to the Federation of Supply and Marketing Cooperatives, in 2003, about 5,000 Chinese companies have recycled products collected by 160,000 registered recyclers and other 500,000 unrecorded. (CABALLERO, 2005). To regulate the sector, China has promulgated, in 2011, the new rules for recycling and treatment of electronic waste: Measures for the Control of Pollution from Electronic Products, Administrative Measures for Recycling

and Treatment of Electric Wastes and Electronic Products (MINISTRY OF ENVIRONMENTAL PROTECTION THE PEOPLE'S REPUBLIC OF CHINA, 2014).

From all these considerations, it follows that although China will continue with new laws, regulations, supervision and punishment, in cases of environmental pollution, this does not translate into a sustainable path. The transformation of China into a green country will happen when its institutions become inclusive. What would happen to a foreign recycling company that wanted to settle in China, only for it had to compete with state-owned enterprises? Does the environmental monitoring in China would not make distinction between state and private companies, in different parts of the vast territory?

IV. MAJOR POWERS: INDIA, RUSSIA, SOUTH KOREA, JAPAN, AND BRAZIL

India in the political economy of climate change

Among the major climate powers, India is the second most populous country in the world, with 1.21 billion people, representing 18% of world population. Seventh of the world economy (place held by the Brazilian economy in 2015), with a GDP of 2.3 trillion and GDP per capita of \$ 1,504 (IMF, 2015). India emits 3.6 billion tons of carbon, equivalent to 3 tons of carbon per capita and 0.8 tons per \$ 1,000 of GDP, or 0.3 million tons of waste every day (VIOLA, FRANCHINI, RIBEIRO, 2013).

With the population growth in urban centers in recent decades, the Indians started to generate 8 times more waste in 2011 than in 1947 (CENSUS OF INDIA, 2011). According to the study of Rakshak Foundation (SHUKLA, 2013), the generation of waste in India, in 2011, was 0.5 kg/day of waste, and 2% of waste is disposed of on the streets and 91% have no treatment, going straight to controlled landfills and dumps. According to the study of the World Resources Institute (WRI), the Indians have raised their emissions by 172.48% of GHGs from the waste sector between 1990 and 2011 (WRI, 2015).

Conservative power believed that the tenets of major religions like Hinduism, Buddhism, Jainism and Skhismo negatively corroborate to the implementation of new technologies. Historically, India is one of the oldest civilizations of Asia, maintaining a development based

on a unique rigid caste system. But does that explain the non-adoption of new forms of solid waste management? It is argued here that there is no evidence that culture or Indian values compete to prevent the adoption of new technologies and practices.

Largest producer and exporter of textiles, in the eighteenth century, India, under the control of Delhi Mughal emperor, stagnated the economy with their extractive institutions. Without incentives of political institutions, India has eliminated the potential markets of the textile industry, marking the beginning of a long period of deurbanization and worsening poverty. Instead of exporting, India began to buy the British textile and cultivating opium to sell in China (ACEMOGLU, ROBINSON, 2012). As shown, it was not the sociocultural rigor, that Indians were submitted to, which prevented them from increasing textile productivity, but it was more profitable for the authorities and bureaucrats cultivate opium.

The effect of extractive political institutions is the kicker, manifested in various ways. Among the effects of extractive institutions is the increase in infant mortality due to lack of adequate sanitation facilities, especially on the poorest populations. According to UNICEF officials, half of stunting problems of children around the world is a result of poor sanitation. The World Health Organization (2012) reports that 620 million Indians defecate outdoors and over 75 million liters of human waste flow annually to the Ganges River. How good is a cultural revolution to change the attitude of Indians in relation to sanitation and hygiene in the context of an apolitical system without effective constraints on their actions and without pluralistic elements?

Indian health services have a long history of inefficiency and failure. Health care provided by the government is, at least in theory, widely available and inexpensive, and professionals are generally qualified. Even the poorest Indians, however, use government health facilities, preferring instead to private providers and more expensive, irregular and sometimes even disabled. Health organizations, as public institution, in India, spend most of the time with the doors closed (ACEMOGLU, ROBINSON, 2012).

The first Indian environmental law, the Forest Act, was enacted in Gandhi in 1920. However, only 50 years after the first environmental law, in 1972, has established an environment department, becoming Ministry in 1985. A year after the creation of the Ministry of

Environment, new environmental rules were imposed which, over the years, proved to be ineffective. The first rules on waste management for cities and citizens of India were imposed only in the XXI century, the Solid Waste Management Committee, covering aspects of collection, segregation, storage, transport, processing and disposal. However, these institutions have failed to prevent the deaths of 1 million children up to 5 years each year (A-GLASS, 2012). These historical events, not cultural, show that the lack of punishment for the institutions and corrupt political authorities are among the main causes for the inefficiency of the Indian environmental system.

The inefficiency of public administration can be seen also in the fact that India will replace China in a decade as the country with the highest levels of greenhouse gases (VIOLA, FRANCHINI, RIBEIRO, 2013, p. 251). Perhaps the cultural facts are not linked to religion or overpopulated territory, but an inefficient system of parliamentary democracy, with extreme inequality and outdated perceptions about climate change as the main vector. "For more persistent than the institutions are under certain circumstances it can quickly become" (ACEMOGLU, ROBINSON, 2012, p.50).

Russia in the political economy of climate change

After the collapse of the Soviet Union, in 1991, Russia became one of the top economies in the world, holding today the fifteenth position in world economy, with a GDP of \$ 1.176 trillion and GDP per capita of \$ 12,900 (IMF, 2015). With a population of almost 150 million inhabitants, an estimated 90 billion tons of waste is accumulated in Russia, and this volume increases 3.5 billion tons per year, and the expectation for 2025 is to generate 450-500 kg per capita (TEKES, 2013). GHG emissions from the waste sector between 1990 and 2011 increased its emissions by 29.18% in Russia.

The economic trajectory of the Socialist Soviet regime is an example of how incentives offered by the state can produce extractive institutions and how that growth collapses. With the death of Lenin in 1924, the revolution of Soviet Russia did not seek to address the causes of poverty, corruption, tyrannies, wars, but to promote and maintain an elite dictatorship. Stalin's economic growth was based on developing the industry by a crushing tax burden on the population, especially in politically opposed groups, they were not politically loyal.

Under the command of a small elite, the labor was reallocated from agriculture to industry, and agricultural production used to feed the factory workers and military. With the fall in food production, six million people died of starvation and workers who disobeyed were judged guilty of crime, arrested and even shot. It is estimated that between 1940 and 1955, 36 million people have been convicted for labor violations (ACEMOGLU, ROBINSON, 2012, p.102). Although the loss of life has achieved a growth of 6% per year until the end of the 1960s, this was not sustainable.

The low level of technological innovation over the years has paralyzed the economic growth of the 1970s and extractive institutions of the Soviet Union reflect these developments in different areas. Waste, for example, has been neglected by the government, which focused on heavy industry and subsequently the production of oil and gas. In 1980, the system completely collapsed and then President Mikhail Gorbachev began a process of change in extractive institutions generating perverse incentives.

With the change in people's lifestyle, after the fall of the Berlin Wall, there was an increase in the volume of waste by 15% per year, making sustainable management of MSW a major challenge for the Russian Federation of the century, mainly for megacities as Moscow and St. Petersburg. According to the study "Future of Waste Management in Russian Megacities" (TEKES, 2013) in 2013, among the 1,000 companies operating in the area of solid waste management in Russia, 40 were foreign. These companies offered the collection, transport and final disposal for more than 90% of the population. Solid waste in Russia, between 92% and 96% are not recycled or reused and only 8% of solid waste have a proper disposal.

As seen, each society creates its own institutions and quirky ways to recycle their waste. Some states pay for recycling, others charge, but of all the countries surveyed, Russia is the only nation that charges three times its population to recycle, compared to traditional methods of disposal. To change this situation, the central government of Russia has started in 2012 a complex strategy for the development of MSW management by the year 2020. With the world's largest share of military spending in the GDP in 2014, 4,8%, ahead of the US and China (SIPRI YEARBOOK, 2014), the country emits 2.8 billion tons of carbon, equivalent to

5.5% of global emissions, 20 tons per inhabitant and 1.2 tons of carbon per each \$ 1,000 of GDP (VIOLA, FRANCHINI, RIBEIRO, 2013).

What if instead of military spending size Russia prioritize the strategic plans for the management of solid waste, such as coping policy climate change? With the increase in public-private partnership (PPP), the logistics of waste in Russia is expected for the next 15 years that recycling will grow more than 80%, increasing its commercial viability, especially for industries. This growth in recycling is based on the increase of sanctions in increasing the educational level of the society towards environmental issues, companies towards their social and environmental responsibilities and mainly due to increased public efficiency in the management of solid waste.

At the end, the question remains whether the new incentives given to the industry of solid waste are shown capable of stimulating technological progress or not. It is possible to say that yes, since Russia has the largest natural gas reserves, the second in coal and the eighth oil, occupying a unique position in the carbon cycle. However, history shows that societies have developed extractive institutions, failed to succeed in its environmental policies to impose order in their territories in a sustainable manner. Will Russia of the XXI century, despite having the largest number of academic graduates than any other nation, be able to generate institutional innovations to support strategies for management of solid waste?

South Korea in the political economy of climate change

The Republic of Korea, commonly known as South Korea, is a country of such statesman in the forefront transition to a low carbon economy. Eleventh world economy, with a population of 50 million people, a GDP of \$ 1.435 trillion and a GDP per capita of \$ 35,277 (IMF, 2015), South Korea sends annually 676 million tons of carbon, representing approximately 1.3% of the global total and 14 tons per capita, 0.43 tons per \$ 1,000 (VIOLA, FRANCHINI; RIBEIRO, 2013). In 2009, they have generated 19 million tons of solid waste. However, despite the rapid industrialization, urbanization and population growth, the generation of solid waste decreased 0.39 tons per capita in 1995 to 0.37 tons per capita in 2009 (KOREA REPUBLIC, 2010). This data reflected a decrease of 1.71% in the generation of GHGs from waste between the years 1990 and 2011 (WRI, 2015).

In contrast, North Korea has raised in 13.54% its GHG emissions from the waste sector, between 1990 and 2011 (WRI, 2015). Led by Kim Jong-un, Supreme Commander of the Army, North Korea is a communist country, poor, totalitarian and oppressive to its own citizens. The country is immersed in economic and social stagnation, with the GDP of \$ 40 billion, being the GDP per capita around \$ 1,000 because of its population of 24 million people, but the government claims to be doubled. The development in North Korea is quite gloomy and environmental costs are increasing due to the use of obsolete technologies of heavy industry and mining. The lack of institutional capacity to regulate the environmental performance generates a vicious circle (ACEMOGLU, ROBINSON, 2012), which includes the improper disposal of liquid and solid waste.

Despite sharing a border, why does it have the contrast in the management of solid waste between South and North Korea? Because both Koreas have and encourage different institutions and move economic actors in different ways. Before Japan's surrender on 1945, the Korean colony was traditionally based on agriculture. Divided after World War II, the South would be administered by the US and Japan and the Northern part of the country by the soviets. The contrast between the Koreas was when the North adopted a rigid model of planned economy, and the South a market economy, built on private property (ACEMOGLU, ROBINSON, 2012).

In the 1960s, to free itself of the great external dependence, South Korea nationalized banks and launched an investment program to sectors and most successful companies, such as the textile sector; strategy not adopted by India in the eighteenth century. In contrast, North Korea nationalized all industries, banned the market and draining investment. While the North grew up in poverty, including economic institutions of South neighboring stimulated industrialization, raising the domestic savings rate. Major investments were made in education, reaching, in 1990, the highest rates of literacy and education. With increasing population qualification, the government has channeled loans with favorable interest rates and subsidies for steel, petrochemical, shipbuilding, automobile and equipment and machinery, later and high-technology fields.

As regards the management of solid wastes, it is possible to check the different pathways taken from the surrounding. While in the North the basic law of Environmental Protection from 1986 did not leave the paper (FESHBACH, M. FRIENDLY, 1992) in the South, the state ensured all public services and institutions were holding the ability to impose order and law. Among regulations and policies adopted in South Korea, as regards the management of solid waste include: Waste Deposit Refund System (1991), Act on the Promotion of Saving and Recycling of Resources (1992), Volume-Based Waste Fee (VBWF) (1995), Extended Producer Responsibility Initiatives (2003), and Food Waste Mandatory Separation (2005).

Although emissions of South Korea are not as relevant, gradually the country is consolidating its place in the new global architecture of the great climate powers due to its capacity for innovation, competitiveness, technological and human capital. With high vulnerability to climatic effects, the South Korean government stands by the level of investment in renewable technologies, initiated by the new cycle of partially environmental policies. "Korean elites were those best able to equate the financial crisis and the climate crisis, allocating 80% of fiscal aid package to clean measures" (VIOLA, FRANCHINI; RIBEIRO, 255, 2013.).

Japan in the political economy of climate change

Third economy in the world, Japan, due to high energy efficiency, could reduce by 3.54% GHG emissions from the waste sector, between 1990 and 2011 (WRI, 2015). With a population of 130 million, GDP of \$ 4.2 trillion and a GDP per capita of \$ 38,600 (IMF, 2015), Japan is a highly vulnerable to the adverse effects of climate country. Raised from the ashes, Japan is a great reformist power, which began its process of modernization, the old feudal institutions and the end of the Tokugawa family domain. After the Meiji Restoration in 1868, Japan abolished feudalism and established the equality of all classes before the first written constitution in Asia.

Japan until the mid-twentieth century, failed in its democratic journey due to its ultranationalist political institutions. By the end of World War II, the country understood that there are good public policies that must be inclusive political and economic institutions, and these should rely on an appropriate legal framework. It was from the Constitution of 1947 that the state bureaucracy built inclusive economic institutions. On behalf of the nation, the

political bureaucrats encouraged the different economic agents (consumers, workers, businesspersons, politicians) in networks (keiretsu and Shudan kygio), helping them to compete in foreign trade.

The "Japanese miracle" has occurred when the government directed the scarce resources to specific sectors of the economy to increase productivity. With changing downtown sectors to high technology and assistance in exports, the trade surplus, shaped by political institutions, enabled Japan full development until the mid-1980s, when bubble burst the real estate and stock markets. But even with an economic performance below their potential in the years of stagnation, the government continued providing social improvements such as high-quality sanitation for all.

The first law of Japanese household waste has been established through the reconstruction of post-World War II country, but for the establishment of the current waste management system, introduced in 1970, the Law on Waste Management (Waste Management Law). Later came the Law for the effective use of resources (Law for Promotion of Effective Utilization of Resources), adopted in 1991 and, in the late twentieth century, it was approved the Basic Law for the establishment of the Company with Effective Material Cycle (OVERVIEW OF JAPANESE LEGISLATION ON WASTE MANAGEMENT, 2013).

To strengthen environmental institutions, it was created in Japan, the system of the 3Rs (reduce, reuse and recycle). This system is distinguished by laws, where on one side there was the responsibility of the producer (packaging recycling law; Law of recycling electronics, vehicle recycling law at the end of life), and the other, the generator waste (Law recycling of construction waste; Law of recycling food waste; Law for promotion of green purchasing) (ENVIRONMENT AGENCY, 2013). It is estimated that the application of these laws has contributed to reduce its annual waste 50 million tons to 36 million tons (MUNICIPAL SOLID WASTE MANAGEMENT, 2014).

The city of Tokyo has 8.3 million inhabitants, and it is a good example of success in the management of RSUs for successfully reduce the amount of waste generated, which in 1989 was 6.13 million tons, and in 2005 reached the mark of 4.45 million tons. On the opposite hand is the city of São Paulo/Brazil, with its 11 million inhabitants, it has accounted for 16.23

million tons per day. The increasing waste in the city of São Paulo to 1 kg per capita per day in 2010 has generated direct impact on emissions of greenhouse gases (GHGs). The amount of São Paulo emissions, solid waste accounted, in 2005, 6.7% of emissions and in 2011 began to contribute 15.6% of emissions (CETESB, 2011). What is the difference between the Waste Management System Solid in Tokyo and in Sao Paulo?

In Japan, after the Basic Law for the establishment of the Company with Effective Material cycle in 2000, the economic institutions of Tokyo were encouraged by state policies, to practice the system of the 3Rs along with the selective collection, clean production, reverse logistics, shared responsibility and sustainable consumption. To solve the population density and limited space for construction of embankments, Tokyo built 21 (twenty-one) incinerators with high efficiency energy recovery.

In São Paulo, the rules, policies and solid waste programs restricted the different agents to practice the 3Rs system. The result is seen in compromising the quality of services provided, technological obsolescence and ineffectiveness of single incinerator São Paulo, the low quality of consumer awareness and recycling programs (BIZZOTTO, 2010), the low coverage of selective collection, especially for families with lower purchasing power, precariousness of health and safety for the 20,000 pickers (BESEN, 2011), the supervision of absence in implementing reverse logistics and shared responsibility, established by Law 12305 of 2010, the National Solid Waste Policy.

According to the National Sanitation Information System (SNIS, 2010), per capita spending on urban sanitation services in the city of São Paulo is R\$ 73.63, while in Tokyo is R\$ 1,036.48. It was concluded that in the domestic level, Japan is a high quality democracy with inclusive institutions, to the point that, at international level, Japan's political system is conservative, in the environmental arena, and its position falls short of its possibilities. Even after the launch Chilling plan to Earth in 2050, the country still lives with enough fear of the future, with regard to nuclear energy, and the government Liberal Party (conservative) seeks the most hide reality to protect private interests.

Brazil in the political economy of climate change

Brazil is going through a period of institutional weakness between the executive and legislative powers in relation to environmental issues, which complicate compliance of international treaties (BARROS-PLATIAU *et al.*, 2012). Consequently, conclude the Barros-Platiau authors *et al.* (2012), the obligations assumed by Brazil are not supported by subsequent domestic policies, endangering national capacity to honor its international commitments to reduce their emissions of GHGs, with the element main reduction of Amazon deforestation.

The domestic level, the rate of solid waste generation in Brazil in 2013 was 209,280 tons per day, corresponding to per capita generation of 1.041 kg/person/day (ABRELPE, 2014), enough to fill 1,160 Boeing 747. These data are reflected in the increase in 54.15% of GHG emissions from waste between 1990 and 2011 (WRI, 2015). Key country in the carbon cycle, Brazil is an example of economic growth with extractive political institutions. Brazil's growth has been achieved because elites manage to allocate resources on activities that could and can control, such as the case of State Company Petrobrás, which in 2014 accumulated a debt of over \$ 100 billion, much of these related to corruption. According to the National Truth Commission report (2014), in Brazil, provided that Delfim Neto, as Minister of Finance, has created a protectionist policy, construction companies, win contracts and, in turn, help finance political operations.

While the assets of the elites grow and are well protected, much of the population of 202 million inhabitants, does not have rights to the GDP of \$ 2.3 trillion and GDP per capita of \$ 11,800. In this regard, what is observed in Brazil is that the country behavior has not changed much since 1964, since the economic incentives are not to serve the population, but the elites. Elites that in Brazil cannot live with the democratic state and deny their own development. In Brazil, the tax revenue increased from \$ 650.13 billion in 2004 to \$ 1,955.80 billion (1 trillion, nine hundred fifty-five billion and 800 million), with nominal growth of 201% and growth real 78%, excluding inflation measured by IPCA (IBTP, 2015).

According to Homes and Rojas (2012), the greater the perception of corruption, the lower the confidence in representative institutions. Brazil is in the 69th position of perception ranking as corruption. Of the 175 countries surveyed, Brazil is more corrupt than countries in Africa such as Ghana, Namibia, South Africa, Senegal and Rwanda (TRANSPARENCY

INTERNATIONAL, 2014). Amid the lackluster confidence in governments and market actors, vulnerable groups do not believe in a satisfactory solution to the increase of GHG emissions in Brazil, which are 2 billion tons of carbon, 11 tons per capita and 0.9 tons per \$ 1,000 (VIOLA, et al., 2013). For total solid waste generation in Brazil in 1982, each Brazilian generated half a kilo of waste daily. In 1996, the average was 750 grams per capita. In 2013, the amount reached 76,387,200 tons, an increase of 4.1% compared with the year 2012 (ABRELPE, 2013).

In Brazil there are 513 federal deputies, 1035 state deputies, 81 senators, 56,810,000 councilors, 27 governors, 27 vice governors, a president and a vice-president in 32 political parties; plus more than 10,000 commissioned positions. As it is noticed, although extractive political institutions can generate growth, while there is a political reform to wipe the State machine and to invest more in the citizen, this growth will not contribute to public policies to mitigate and adapt to climate change.

V. AVERAGE POWER: CHILE

Chile in the political economy of climate change

Chile had everything to be a typical Latin American country with political and economic institutions gatherers, unable to cope with prosperity. With high Human Development Index, Chile's population is 17.6 million people, GDP of \$ 277 billion and a GDP per capita of \$ 15,700 (IMF, 2014). In the 40th world economy position, the country is extremely vulnerable to climate change (BRAZIL, 2011), generating 0.5% of the emissions of global GHGs, which is 70 million tons of carbon dioxide (CO₂), about 3.9 tons per capita (CNE, 2008).

Important country in the carbon cycle, the change of energy policy in Chile will take until 2030 to issue about 300 million tons of CO₂, more emissions than many countries in Europe and other developed countries (CNE, 2008). In 2004, Chile experienced a drastic shift in the energy sector when Argentina announced restrictions on exports of natural gas to meet domestic consumption. In 2009, Chile inaugurated the liquefied natural gas complex (LNG) and the first ships with LNG arrived from Equatorial Guinea and Egypt. In addition, the

government has encouraged the development of power plants fueled by carbon and hydro plants, which in the long run, can generate environmental consequences of major proportions.

Despite this scenario, criticism of the government are on the rise in 41.38% of GHG emissions from the waste sector between 1990 and 2011 (WRI, 2015). To curb the increase in emissions in 2005, the Chilean government has approved the Management Policy Integrated Solid Waste (GOBIERNO DE CHILE, 2005), making it binding in all regions of Chile, waste management hierarchically: prevention, reuse, recycling, energy recovery and disposal. The Solid Waste sector is one of the strategic focuses on Chile, only a decade ago, mainly because of the concentration, distribution and population growth, as well as international agreements ratified, such as the Kyoto Protocol. Despite the efforts of different Chilean rulers, there are many dysfunctions between expected by the institutions, regulations and inspections and their effects.

The question is why the country's most successful policies in terms of economic and social development, cannot trigger Inclusive Management of Solid Waste? Because inclusive political and economic institutions existing in Chile, did not create a virtuous circle (Acemoglu, Robinson, 2012) in the comprehensive management of solid waste. The Public Policy Center of the Catholic University of Chile, highlights (2013) that for the operation of the Solid Waste Inclusive Management system it is required that the costs of waste recovery are similar to disposal rates in health and higher embankments to rates disposal in controlled landfills and dumps. It is also necessary that companies have incentives to recover the waste generated and the law El DS No. 189, 2007, which determines the closing of landfills (in force since 2008), is fulfilled.

In Chile, dissatisfaction with social exclusion from political participation in the game of power, which involves the management of solid waste is reaching a critical point: training among the elites, consensus that the only way to avoid a social flashpoint is promoting reforms. In this direction, it is pending in the Chilean Congress, since September 2013, the bill for the Recycling Framework Law for Waste Management and Responsibility Extended Producer (REP). It is expected that the Law will contribute to social inclusion and decisively promote the transition from Chile to a low carbon economy in order to avoid irreversible and dangerous effects of climate change on companies and workers (ILO, 2007).

VI. DISCUSSION AND CONCLUSIONS

Considering this facts, the study has offered an institutional logic of explanation that is reflected in the design of environmental policies and climate commitment level of governments (VIOLA et al., 2013). By focusing on the assessment of macro-political system of the key nations in the carbon cycle, the study argued that the main independent variable (VIP) quality of political and economic institutions changes the rules of the social game that determines the outcome of the dependent variable (RV) public policy. At this point, the study advocated confirms the main hypothesis: the quality of political and economic institutions is crucial in public policies in the field of solid waste management, as a coping policy of climate change.

Focusing on institutional genesis in key countries in the carbon cycle to understand how the different political and economic institutions are formed, the study explained the problem of well-intentioned approaches to development, such as the Millennium Development Goals (MDGs). They are seeking for a prescription without assuming the quality of governance of political and economic institutions. As a result of such a logical error, vulnerable groups are those who suffer the most from the impacts of political and economic institutions Extractive: exclusion and loss of safe spaces.

The study found that on extractive institutions, climate commitment will be conservative and power will be concentrated at small elite that seeks to extract the various environmental resources of society for the benefit of a few. So, countries with extractive institutions fail in their public policies as countries with inclusive institutions will be more successful in the development and implementation of public policies, to foster a virtuous circle that promotes more efficient protection of their vulnerable populations and promote human development.

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