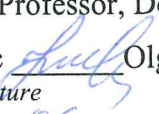


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Permitted to defend  
Head of the main educational program  
associate Professor, Doctor of  
Economic  Olga P. Nedospasova  
*signature*  
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Circular Economy and Solid Waste Management: A Comparative Study  
Field of studies: 38.04.02 – Management  
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Camilo Andres Sánchez Bozo

Scientific advisor

  
*signature* M.S. Kaz  
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Written by  
Master's Student group 272011

  
*signature* Camilo Andres Sánchez Bozo  
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NATIONAL RESEARCH  
TOMSK STATE UNIVERSITY (NR TSU)  
Name of the educational structural unit

APPROVE

Head of the main educational program  
associate Professor, Doctor of

Economic signature Olga P. Nedospasova

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Sanchez Bozo, Camilo Andres

*Last name First Name Patronymic of the student*

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*rank, place of employment*

The task was accepted by  
Master's student, group 272011

*rank, place of employment*

signature

/ Mikhail C. Kaz  
*Full name*

signature

/ Sanchez Bozo, C.A.  
*Full name*

## **Abstract**

The management of household and commercial waste is a line of management born from the ornament or public health started in Victorian London that has expanded and evolved. In the evolution its management has been state or private, going from the payment of services to manage the cleaning to an ecological vision of this management, at the same time the economy, having the environmentalism of the 60s, begins to see the opportunity to transform garbage into a resource. This begins the recycling of materials according to available technology. Such waste management has been extended to areas beyond citizens. The changes in marketing have gone on to add the concept of reuse and reduction as ecological stamps. The present addresses these concepts from the management to then compare the waste management in Chile, a small advanced country and Russia, one the most geographically diverse country latitudinally (north south) and another broad east-West direction). Both countries have territories that are difficult to access, and Chile, being a country with 8 times less population, serves as an example that even with a low population, actions of the 3 R or "Zero Waste" can be carried out.

Aspects such as access to information, culture in general, political, administrative, historical aspects among others were evaluated as far as possible. Together with economic aspects, all these elements are contained in the so-called CAGE (cultural, administrative, geographical economic aspects). It was not analyzed properly as CAGE since the geographical aspect refers more to a local management than national, there are references to the country. Geographical management in such geographically diverse countries is not possible its generalization is used. The management in 4 parts of Chile was referred to as an example

The purpose of the research is to compare the situation of both countries, their strengths, weaknesses, opportunities and threats (Swot) focused mainly on recycling and the development of ecological awareness / mentality. The main objective of this is to see through criticism how to improve and increase the management capacity in Tomsk, which elements of the Chilean experience should be considered. Originally the idea was to see the possible scenarios, but due to the circumstances this looks unpredictable

Key words: Circular Economy; Solid Waste Management, Russia, Chile, Swot Analysis

## Аннотация

Управление бытовыми и коммерческими отходами - это направление управления, родившееся из сферы здравоохранения или общественного здравоохранения, зародившееся в викторианском Лондоне, которое расширилось и эволюционировало. В эволюции его управление было государственным или частным, переходя от оплаты услуг по управлению уборкой к экологическому видению этого управления, в то же время экономика, обладающая экологизмом 60-х годов, начинает видеть возможность превратить мусор в ресурс. После этого начинается переработка материалов в соответствии с имеющейся технологией. Такое обращение с отходами было распространено на районы, недоступные для граждан. Изменения в маркетинге привели к добавлению концепции повторного использования и сокращения отходов в качестве экологических штампов. В настоящем документе рассматриваются эти концепции с точки зрения управления, а затем сравнивается управление отходами в Чили, небольшой развитой стране, и в России, одной из самых географически разнообразных стран в широтном (север-юг) и другом широком направлении восток-Запад). Обе страны имеют труднодоступные территории, и Чили, будучи страной с населением в 8 раз меньшим, служит примером того, что даже при низкой численности населения могут быть осуществлены действия 3 R или "Ноль отходов"(Zero waste).

Насколько это было возможно, оценивались такие аспекты, как доступ к информации, культура в целом, политические, административные, исторические аспекты и другие. Вместе с экономическими аспектами все эти элементы содержатся в так называемой КЛЕТКЕ (культурные, административные, географические экономические аспекты). Это не было проанализировано должным образом, поскольку, поскольку географический аспект относится скорее к местному управлению, чем к национальному, есть ссылки на страну. Географическое управление в таких географически разнообразных странах невозможно, используется его обобщение. В качестве примера было приведено управление в 4 частях Чили.

Цель исследования - сравнить ситуацию в обеих странах, их сильные и слабые стороны, возможности и угрозы (Swot), ориентированные в основном на переработку отходов и развитие экологического сознания / менталитета. Основная цель этого состоит в том, чтобы сквозь критику увидеть, как улучшить и увеличить управленческий потенциал в Томске, какие элементы чилийского опыта следует учитывать. Изначально идея состояла в том, чтобы увидеть возможные сценарии, но в силу сложившихся обстоятельств это выглядит непредсказуемо.

**Ключевые слова:** Экономика замкнутого Цикла; Управление Твердыми Отходами, Россия, Чили, Swot-Анализ

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## 1. Introduction

If we pay attention to garbage, the waste will depend on the definition and type. If we look at the dictionary there are many words to define it whether organic or inorganic, its environmental impact is a modern theme, but to some extent it has always been even if it has not been explicitly writing. It depends on whether we consider it garbage, it will depend on what we do with it. The European or Chinese Middle Ages, garbage abounds and people have even been defined as such. The term waste management or management is a modern term, but if it has roots in history. As the population grows, waste increases to a point that is considered problematic. Linked to waste this health (Hodge, 2013, for example, addresses for India) and from the formation of towns and cities is Sanitation. The management of biological or solid waste is also found in pre-Biblical, Greek or Roman cities, but if the word management is a modernist term after Industrial Revolution.

Now the waste and its link to the municipal Administration of the territories (especially the cities), we can see it as in multiple cases [1] among them the case of Los Angeles [2] Chicago [3] Florida [4] Bogotá [5]. eThekiwini in South Africa [6] Managua in Nicaragua [7] Beijing [8] Caracas in Venezuela [9] among others. It is also a topic in rural administrations such as in Mexico [10], Oki town in Japan [11] Tuba in the Philippines [12] Villavicencio in Argentina [13]. Issues such as garbage can be considered as a risk not only for health, but also for activities as in the case of the beaches of the island of San Andrés in Colombia [14] it is also possible to see it in the historical analysis for the coastal city Paranagua[15]. Following the previous line analyses on the island of the Canadian state of Nova Scotia [16].

It is interesting to see that the dirt associated with the term garbage or waste refers not only to it, but also to the business and management of garbage, Strach and Sullivan have done a historical analysis for Orleans and Pittsburgh [17]. Corruption linked to municipal waste management is not something unique to this country but we can constantly see news about it around the world. It is not new and will continue to happen.

An important issue in waste management is the informal management [18] carried out by plastic and cardboard collectors in Latin America especially [19], but also in other places such as Egypt [20], an informal craft that has performed an ecological function and recycling even before the

ecological approach of waste management under the concept of the 3 R (Recycle, Reuse, Reduce) this issue has historically been from a social point of view.

When waste is referred to, one must be careful with this term as previously noted. For this case, household waste will be considered mainly or so-called urban waste (in this we will include waste typically found as those are household; construction and demolition; hospital; organic waste from food). It should be noted that the concept of waste is strongly linked to pollution, and therefore it is considered environmental impact and there are always relationships or processes to various types of pollution of the components of the environment. It should be noted that in traditional terms of garbage deposits there are 2 types dump and landfills - the semantic difference is more noticeable in Spanish, the main one is in the treatment or isolation of waste and the simple accumulation in one place.

Although from a historic beginning waste management has a strong link with the surrounding environment and health. Since the Industrial Revolution pollution and waste management began to increase its relevance at the public level. Herbert [21] in his historical analysis points out that discussions began in London in the year 1751. Velis and company [22] agree that organized waste management-as we know it - appears in London at the end of the eighteenth century. In social terms in 1842 the report of Sir Edwin Chadwick *"the Sanitary Condition of the Labouring Population"* became vital addressing not only the sanitary point not only with respect to what surrounds us but also addressing the conditions for those in charge of cleaning this report consolidates this vision of management that addresses several aspects, this will continue in terms of trends. Unlike management focused only on production, waste management from the beginning has an environmental and sanitary point of view, in modern structuralism it has also been so, there it is not uncommon to see that in this area management is linked more to the environment than to the economy as it is often associated with management. Its disciplinary limits are strongly linked to Geography, Health, Engineering, Environmental Sciences, policies and administrative management. Although waste management is regulated by government agencies it can be carried out by the same states or by companies or by the Association of these as in the case of Kolbata [23]. Clearly waste management is a business in itself, but the economic study in this area is later, which corresponds to the change of its interests occasioned by the so-called green economy. The momentum in this sense, this generating recycling as a concept, the so-called circular economy is a tendency that as he has understood makes many mistakes at the conceptual level to the steal terms and use them without understanding well, the term upcycle is a test

that you do not understand the concept of recycling does not imply that the recycled material is of low quality, the term refers to processes not materials.

In terms of processes, waste management is approached from a systems and engineering point of view. Concepts such as recycling are based on environmental concepts mainly, because of this the care of the environment and other trends are easily adopted as they address their *raison d'être*. The question What to do with waste? it has always been a problem to solve. While Corbyn Morris proposed throwing them into the River Thames in the early discussions, points out that in 1874 the first incinerators called the “destructors” were created. Accumulating garbage in landfills and incineration are the main methods of final deposition[21].

Organic waste includes various fluids and human body parts (called hospital waste). Incineration remains the best alternative for them with its heat treatment to prevent the transmission of diseases. However, there are other organic wastes that are most commonly associated with the term such as plants or animals. If we go back to history, we find that they were simply left to rot in the open air, until the middle of the nineteenth century or buried (an ecological vision). With the emergence of modern waste management, these became part of the municipal system. In this respect, environmental awareness and ecological ideologies have proposed better uses for organic waste, both at the household and industrial levels. The term composting comes from the Latin “*Compus*”, has been promoted and instilled through environmental education. Composting follows the environmental line and the concept of cycles, its main contribution is the promotion of awareness in the population since it agrees with principles that in the American case is linked to ancestral indigenous visions, in the Japanese case emphasizes this process in its Zero Waste model[24]. Environmental SEALs, Green processes in production are derived from these principles. In economic terms the eco-friendly rating serves as a seal of quality and an added value for our products. The green economy as the circular economy take these concepts to give it an economic value, but the whole process is part of Environmental Management, Waste Management when derived from environmental management is favoured and influenced by this.

The 3 R's have transformed trash into something useful, in a resource, unlike other fields of knowledge or production that have been heavily damaged by the so-called green revolution in underdeveloped countries is seen as an economic opportunity and development as in the case raised for the case of Philippines[25]. Waste management is favoured and enhanced, technical innovations are emerging more and more rapidly. The importance of waste is both an everyday issue and a



business increasingly seen. The green economy includes among its pillars of interest waste management. It is not objective of this text to define the trends between the economy and its concepts, since these are subsequent to waste management and are a different topic of discussion, that yes among the economy closer to the green philosophical approaches more relevance and economic valuation is given to the work done by Waste Management. Recycling, reducing and reusing have expanded the possibilities of management, waste has a greater value and utility thanks to this concept, even talking about waste etymologically would be a mistake if there is an alternative utility. Clearly the view on those who carry out work in this area is changing, the collectors after years of unnoticed work are recognized and concern for them increases. Waste management has a strong local component in the territory in its execution even though its standards may be supranational trends.

As technology advances and management becomes more complex, raw materials can be obtained or recovered for new goods and services. Electronic waste is every day a more serious problem, planned obsolescence or simply natural obsolescence have complicated, the current recycling technology is not very developed in this aspect, a technological change could change this situation allowing to obtain new resources [26]. Unlike the economy that is concerned with obtaining added value or companies have to restructure [27] and the so-called hedonism of sustainability posed by the economic vision in waste management, environmental impact is a basic principle[28]. If a technology by recycling harms the environment, then it is not massed until its environmental benefit is greater than the harm.

The so-called smart cities [29] or sustainable strongly referred to in urban geography and urbanism consider waste management and their utopian Optimum is the concept called “Zero Waste”[29][24]. Finding that optimal is not something achievable especially by overpopulation and concepts of scarcity strongly formulated by the Reverend Malthus, the philosophical current called Neo-Malthusianism raises that this theory has not been given by technological evolution, but there is a point where the population exceeds technological capabilities, seeing social inequalities this corroborates this principle. Waste management and production based on them are the technology that delays Malthusianism, which is why development in this area is fundamental, even if it is considered utopian. This work and fight for Zero Waste, is more typical of the environmental concept than economic, even so, requires a multidisciplinary work where the economy takes part especially with the so-called green economy. In Germany, [30] address how this collaborative work between different fields of knowledge under this concept advances. Under the South American framework Gallini [5]

analyses this possibility of eventually achieving a “Zero Waste” in the Colombian capital. In Japan, [24] proposes as a strategy of promotion and search the model applied in Surabaya. From the geographical point [31] as from engineering [32][33] models are established both for waste management, as well as for the location and dynamics associated with waste.

Construction and demolition generate another type of solid waste in any territory and also an environmental impact, in the case of waste management, these require processing -especially in the case of cities [34][35]. Gurau et al [35] discusses this issue, and if you join the concept of Zero Waste, the ideal is to find a utility to these wastes, something that, while it is emerging already see certain trends, for a construction company is a corporate social responsibility and/or legal the destination of their waste, and pay for them is a cost, in this sense, the recycling of their materials by other agents is seen as a reduction of costs and a seal to their corporate social responsibility (CSR).

Among the possible uses, even incineration can have a utility such as power generation for certain cities as proposed for eThekweni, South Africa [6], although the latter can have its consequences in environmental terms, so to be massed must first be evaluated its impact and refined technology to achieve greater benefit compared to harm. The judgment of garbage [36], the use of pipes and the reduction of waste, which has a relationship with the idea of the environmental impact that affects what raised by Gumbo [6].

Returning to history our recurring friend/enemy that if it is forgotten to repeat itself, Waste Management responds to the idea of solving problems at the social and administrative level both in the past and in the Victorian era. A bad environment generates social conflicts or causes them to explode, especially in the face of the main problem of overpopulation. Harris-White [37] analyses the unsustainable economy in terms of waste and how this generates social conflicts, this agrees with Schindler et al [38] and with what Hilburn [10] proposed for the Mexican rural case where it directly dissociates garbage and home. Diederich [39] & Landsberger [8] gives a somewhat different perspective to explain this by analysing municipal Waste Management from a legal point of view, clearly this approach is always present and will vary territory by territory, the management will be regulated by the local legislation in force [40][41][42]; both in their area and in terms of environmental impact, although the trend in technical terms tends to go faster than legislation [16], but not so in social terms.

Waste management as previously noted tends to be viewed from a local level, but its derived products can relate to commercial exchanges either as an opportunity to exchange [43][44] or as a response to partially fill a need [25];[8]

A tangential area to all this is information and dissemination, ideologies and principles influence this matter, laws are influenced by these, within environmental management this is an area little associated, management is not so much focused on dissemination, rather it is favoured by the dissemination achieved by environmental education and environmental trends. For the above Hird, et al [45] propose to bring to light Waste Management and its work, recognizes that it is present working silently, but addresses negative aspects of not being seen and possible benefits that could be obtained from mass knowledge.

Finally, it is possible to say that Solid Waste Management tries to answer some of the following questions among many others and for this it is intertwined with different disciplines: what do we discard? Who picks it up and by whose order? What is done with the waste? Where is the garbage obtained from? How is garbage collected and managed? Who generates the garbage? Who live near landfills or in unsanitary conditions? How do you educate about it and the relationship education and garbage? How much does it cost us to manage resources? How much do we earn for management? Who pays for our service? What is the environmental impact?

## **2. Objectives and Hypotheses**

The implementation of the circular economy in both countries has had a disparate evolution, and through the comparison certain elements of Chile can be reused to improve management in Russia and Tomsk since it also has stronger geographical differences and with a smaller population, environmental management of waste management, in various forms and levels, has been implemented.

### **2.1 Objective of the research**

1. Analyze The cultural, legal and bureaucratic process
2. SWOT analyzes to both Case
3. 3R in Tomsk vs. Chilean Cases Vitacura & Maipu (communes of Santiago), Valdivia & Puerto Montt, RapaNui (Easter Island)
4. Compare the EU Key Monitoring Indicators (KMI) to Circular Economy between Chile & Russia

### **3: Theoretical Framework**

As can be seen, the emergence of environmental management is long-standing, it does not correspond to economic factors such as business management, its logic is based mainly on the health of people in the cities of the environmental revolution and the question what to do with waste by the authorities [21], due to the English thought system of company formation such management has a logic of execution by private and not by the state. Government objective with recognition of the need for efficiency. This public health service expanded rapidly reaching Chile at the time of the wars of independence of the Americas as part of the set of ideas and ways called *belle Epoque*.

Although the concepts of the 3 R's, recycling, reduction and reuse, are modern from the natural sciences used for political and economic purposes, they are an intrinsic part of Latin culture. The word from the vulgar Latin "Versura" has a relation to dirt and discarded or wasted waste. Such a concept implies in itself not being able to be used, for example if something can be used or reused it ceases to be garbage or waste. Therefore, reusing something is an intrinsic concept beyond its modern ecological redefinition.

Economia circular is a term relatively modern popularized by the architect William McDonough in his book *Cradle to Cradle* (2002), from a vision clearly economic, the distortion adds the concept of upcycling and downcycling, both concepts have the vision of waste material, by adding a false premise that the product to be recycled means to be of poor quality, or equal in quality, even when the concept of quality is not addressed by the concept of recycling, the recycling refers to natural cycles such as the carbon cycle or water, where in each phase there are different paths, changes and interactions, the quality of the product or the same product is not the objective of the cycles since they change but their substance.

Just as we separate the water, carbon, nitrogen or other cycles, we can separate the plastic cycle, the paper cycle or the glass cycle, tectonic cycles (referring to the magmatic movement in the construction and destruction of tectonic plates). Like the cycles of elements or compounds in nature, although they are described separately these can interact together like water and carbon, the cycles are schemes to explain not a single and direct path: plastic and cardboard or paper for example both are part of organic chemistry or carbon chemistry.

The logic of cycles although we talk about closed systems in practice, they are open systems since there are always losses that go outside the planet. Under the logic of closed systems of the

ecological cycles is born the concept of Zero Waste in 1998 in California at a level of communities[30][5] and thanks to the book by William McDonough won more popularity and strength of their ideas to the middle of 2002, not with a focus on disruptive, but I practice primarily focused as a utopia to achieve by the cities where 100% of their waste could be converted into resources either to be used in the same city or by others, by simply extending the R-90's to the 5 r's (Refuse, Reduce, Reuse, Recycle, Rot to achieve Zero Waste at home). This logic does not break with ecological concepts, the economic vision that it adds is not like the circular economy that only focuses on products but on the goal, it does not establish model dichotomies or distorts concepts. This approach for being practical in California at the beginning of 2001 the committee in charge of traditional waste management set it as a long-term goal, then the environmental departments of San Francisco city and county joined. Subsequently, in 2009, mandatory recycling and composting was established as a city ordinance. Then books have been developed about it, especially focused on urbanism.

The Zero waste concept focuses on a goal and the tasks for it integrates different systems, companies, cultures and perceptions in order to achieve its objective including all[30]. The logic followed we can establish that even for different motivations, nationalist, localist, religious, globalist, spiritual, philosophical, ecological, economic or others, the goal unites them taking each one its benefits either directly or indirectly.

Under any vision, technology and / or technique play an elementary role, but management and cooperation are fundamental[31][33]. Under the zero Waste logic, evolution and changes seem natural, in general it benefits from technological evolution, its biggest problems are the coordination between different visions and dialogue. Another problem is that certain conflictive tendencies at the social level may want to distort by adding false objectives or relieve one motivation over another.

The circular economy comes on general concepts or her attempts promoted by the environmental area of the world bank and various authors from the 70s, terms such as Ecoeconomy, green Economy -by Pearce, Markandya and Barbier in 1989-, Bioeconomy (FAO) Blue Economy - by Gunter, P in 2010- among other terms that, although they have different names, the truth does not vary much all promote an economy less predatory resources or address the externalities of the economy, and one of them is waste. The truth, although there are different authors, all these terms are more or less the same, an attempt by economics to conceptualize a responsibility for its depredation of the planet, none without being very clear or solid.

Term as corporate social responsibility, in has been the same at the theoretical level as all the previous concepts but applied to the environment or the planet, the multiplicity of terms is according to an idea that has been around the economy as a result of the exploitation and fear of Malthusian or neo-Malthusian ideas. Concepts such as geoeconomics and economic geography addressed the environment from its impacts, the location and relocation of its activities and in it is where the measurement or the attempt to reduce the impact (externalities) is most observed, nor had the sanitary vision of waste management.

Although the multiplicity of terms has done little if they promoted their approaches to seeing recycling as a business opportunity [43], reuse and reduction give way to different innovations.

The circular economy has concepts of producer responsibility for their product that are valuable and is a trend in European and American legislation. Like any modern concept many tend to think that the beginning of the 80-90 recycling has to do with more modern terms, but in itself is something more inherent to the human being and its technological capacity. The circular economy focuses rather on production and logistics processes, but on whether it is a mixture of the above.

Zero waste although it is an action, at a theoretical level it was not clear, but it addressed psychological, ethical, moral and social aspects. Later theories try to explain it and redefine it or expand it altogether to the concept of responsibility expanding the R's is a clear example, although if we think about it philosophically this is how production should have been originally with a sense of not negatively impacting our environment or repairing or compensating for the impacts, at some historical point we lost our way, it is linked to the concept of doing things well.

Another practical advantage is that the zero residue can be taken by different fields of knowledge, if one impacts it is possible that another will try to repair it. At the social level it is not necessary to waste time with long explanations, on the contrary, it is necessary to teach and share.

Unlike all eco-economies that use ecological quality seals as a brand value, zero waste values it, but more important is the action taken to achieve it. In a nihilistic world, zero waste or green economies are trying to revive the concept of responsibility.

At this point it is clearly important to consider that with green energies and in general, all eco-economic conceptions enhance each other, their popular acceptance and the concept of responsibility in our relationship with the environment is at the bottom of both

environmental responsibility guides in the background all the concepts, and some empower others, the development of one helps another. the economic concepts of responsibility for externalities to the planet, although they are limited only to their field, are approximations, that one is better than another will correspond to the passage of time or from where the author or the facts come from. Zero waste step from a goal to a vision that works and to some extent it is possible to affirm that indirectly the economic visions referred to point to zero waste among them the circular economy

It is interesting to note that all the terms referring to the economies ecological confused with each other, the same ministry of France confused the circular economy as a term born in the 70s [46], when in truth the term is several decades later, this is in line with the source that is the attempt to reduce the externalities of the production model from the point of view of ethics and non-economic. The absence of the environment in the traditional economy generates a large part of its externalities, The green, blue, ecological economies or whatever they were called in the past, is associable with the arrival of new economists in the 70s to the world bank, its former director (New York & Geneva) Alfredo Sfeir Yunis, was considered the first environmental economist. In 1976 until 2009, working in different positions, and even the world bank representative to the world trade organization and the United Nations (1996-2003), Both as those who followed him were motivated by environmentalism and the quest to reduce the environmental damage and to consider it in the economy created a variety of terms and formulae to include their concerns ethical-moral in the economy. The circular economy as a term is after the 2000s and also its approach is theoretical and practical and does not come from economics. Since the year 2015 adopted by the European Union [46], the use of indicators in general terms is a reference model, since a large part of their approaches, even being carried out, were not measured or recorded properly. It should be noted that although the circular economy is the term adopted in 2015 it is still part of the so-called green growth, so the term green economy is homologated to circular economy. The first 10 indicators were defined in 2015 and its first report was 2017 for Europe [46].

Both the circular economy (or green economy) and waste management are not terms originated or based on the economy, but on management or administration (origins in environmentalism and health, respectively), being of recent application is constantly expanding.

The key process indicators (KPI) can be called key monitoring indicators (KMI) since although there are processes, management is based on management monitoring, not on industrial



production. The standardization of these is not unique or exclusive, so in other countries both their formulas and the KMI vary.

For European standards indicators to 2021 can be set in 11 on the country level, at the local level, (Domestic material consumption per capita; Resource productivity; Material footprint; European ecolabel ; Number of industrial symbiosis initiatives; number of companies and local authorities that have been supported by Ademe for the functional economy; Food waste; Household spending on product maintenance and repair (excluding vehicles); Landfill tonnage trend; Use of secondary raw materials; Jobs in repair and recycling. Many of these indicators their measurement can vary both in methods of calculations and in the frequency of measurement.[46]

Other important points in the measurement and development of the second-hand market, which does not have a measurement standardization, but which itself is conceptually promoted by reuse.

## **4. Case studies**

### **4.1. Chile: where the earth end**

#### **4.1.1. Brief of Chile**

Chile country located on the American continent in the southern subdivision from 17°30' to 56°30' de south latitude, of great latitudinal extension but of relative East-West width, varying between 90 km in its narrowest part to 350 km in its widest part. It is a country abundant in relief, surrounded by mountain ranges from north to south and from east to west, generating transverse valleys up to the approximate 40 degree latitude south, then the main cordillera of the Andes begins to dive into the sea, generating the area of fjords from within reloncavi the so-called Patagonia. Due to the submergence of the Andes and its reappearance in Antarctica as antartandes, Chile is one of the 12 countries with a claim to Antarctic territory. Chile also has Antarctic bases and settlements with island territories, some of them on the oceanic continent such as the populated Easter Island and the unpopulated Salas y Gomez Island.

The history of Chile is a mixture of diverse indigenous peoples with the Italo-Hispanic culture to the arrival of the Spaniards to America and its subsequent conquest. The current borders are the result of the Hispanic delimitations of the second reform to the viceroyalties with slight modifications. The arrival of the Spanish was motivated by the cravings of gold and fame, the first being the expedition of Diego de Almagro (1536) then later colonization was begun by Pedro de Valdivia, 1940, the beginning of the foundation of cities like La Serena, Santiago, Valdivia, Concepción, among many together several strong. It should be noted that later the governor of Chile Gustavo de Mendoza founded cities on the other side of the Andes Mountain range such as San Luis or Mendoza that with the reform of the viceroyalties of 1776 went from being Chilean to belonging to the new Viceroyalty of la Plata. The native peoples were not characterized by their unity or the founding of large settlements, beyond some belonging to the Inca empire. The imposition of the unified Spanish crown led the indigenous people to be considered to be instructed in the faith which led to the encomienda system, to miscegenation and the study by the monks of the indigenous cultures and to a syncretization both religious and in language, this occurred in all Hispanic territories from the now United States to Patagonia.

The population of Chile in 2020 is approximately 19,458,000 million throughout the territory according to estimates by the National Institute of Statistics (INE), distributed like most countries in

the Americas macrocephalously concentrated in the capital and nearby cities, which constitutes since colonial times the La Serena-Santiago-Concepción axis as the national nucleus since the Hispanic era. Chile has about 96.4% literacy the official language is Spanish, although the Chilean dialect has many particularities as a result of both the adoption of words from diverse indigenous languages such as remnants of old Castilian and coa or prison slang or peoples who arrived after independence.

Chile during the colonial centuries received little influx of mainly Spanish immigration or from Italian states linked to the crown. After independence in 1825 the trend continued, the extensive and sparsely populated country was a continuum until 1970, in the 1850s certain groups of migrants arrived from the future Germany and Italy brought by the governments of Chile, also groups of Coptic Christian Palestinians who fled the Turkish empire. Although there has always been a low migratory flow of Spaniards, a strong flow occurred in the 1930s as a result of the Spanish civil war migration managed among others by the future Nobel laureates of poetry Gabriela Mistral (1945) and Pablo Neruda (1971). It is also considered a migration from the countries of the former Yugoslavia to the extreme south in Punta Arenas. Migrations have intensified mainly since the 2000s with populations from countries such as Peru, Colombia, Haiti or Venezuela. The estimate as of 2019, 7.67% of the population approximately, 1 492 522 people are foreigners (INE).

Previously in the censuses, the indigenous registration was scarce, from the year 2002 begins a revaluation of indigenous cultures and an identification with them, for which there is a duality between a relatively homogeneous mestizo country (about 95% mestizo to the year 2002) to lower percentages, even supposed native Afro-descendants, something strange considering that as a result of the transport conditions, practically no black slaves arrived in Chile throughout the colonial era and only a few managed to cross the Andes mountain range in the wars of independence of 1818 from Argentina that later left for the liberation of Peru. The population changes started mainly in the first government of Michel Bachelet (2006-2010), these data do not fit with the indigenous pattern that comes from the ILO convention on indigenous peoples ratified by Chile. For the subjects of this study, the racist question raised has no greater relevance, but in historical terms it has a political manifestation in political conflicts, in the attempt to change current constitutional took manifestation in the elections, corrupting the results with a overrepresentation and ironically most of the Indians don't vote for these alleged representatives of more than 95% vote by the ordinary in the elections 2021 and in the query indigenous to the new constitution (2022) does not meet or 0.1% of the pattern

indigenous demonstrating that the majority of indigenous people feel that they are integrated despite the fact that certain politicians try to create false dichotomies.

Beyond the political use of ecology and its perversion political activism called ecologism, the concern or awareness of ecology comes from pre-Columbian indigenous roots, the ethos of nature manifests itself in various ways in cultures, the Andean cultures of the north use the concept of Inca PachaMama, where man is linked to nature and even in each celebration part of the food and drink are given to the earth as an offering varying from town to town how much of the offering should be delivered. The Nehuen concept, from the reche or Mapuche cultures is a worldview where the soul or "nehuen" "is a mixture of the spirit of the ancestors and/or nature, the same term "mapu" means earth, so the concept is people of the earth. In fact, in Chile before 1973, major interventions, except for mining, were scarce. The reforms of the Augusto Pinochet dictatorship (1973-1989) changed the concept of nature in legal terms, article 19Nº8 of the constitution still in force (1980 amended in 2005) included the concept of nature protection in law, but not in practice. With the beginning of democracy and economic development, there began a lack of control in the intervention of the Chilean territory respecting little and nothing nature, strongly influenced by the TakeAway concept from the USA. The environmental Bases law was published in 1994[47], but its regulation in 1997, from the last of these years the environmental impact assessment system was started to evaluate the projects their consequences and compensations according to the laws. The environmental bases law was amended in 2010 and the ministry of environment (MMA)[48] was created, the system has its changes, housing complexes in general terms are in accordance with the land use law and laws or other instruments of different scales, in general terms they are not regulated by environmental laws, the laws of the ordinance of urbanism and constructions is the main instrument of regulation and communal, intercommunal plans, interprovincial or regional that have certain constructive measures according to the categories of construction and infrastructure defining zones of risks or natural catastrophes.

As mentioned, briefly in the problematic of the topic, the concept recycling with the previously called cartoneros[49], ropavejeros or other terms previously or now euphemisms such as base or territorial collectors (valorisadores)[50][51], carry out recycling work since time immemorial[19]. The concepts of recycling, reducing and reuse have a long history in Latin history, and the old great colosseum when it fell into disuse was used for grazing and its construction was dismantled to be used in nearby buildings. The collection of cardboard and wood has a long history in the country that is difficult to foresee[52]. Even in colonial times the cutlery and cups were made

of clay that when broken were used in agriculture or ornament of houses and cities. Chile was always the most distant and inaccessible colony of the Spanish empire, the poverty that entailed forced the reuse and reuse. Even if we see the reche (Araucanian) war with the Spaniards the Malone warriors were warriors who reused the Spanish armor and weapons parts with armor, clothes and weapons created by the natives. Mapuche silverware is derived from the knowledge of metallurgy brought by the Spaniards.

in the same Latin line, in France those who collected rags that others threw away were called ragmen, and there on May 17, 1961 in Chile began to recycle the ragmen of Emmaus. social organization has been organized to social rehabilitation and recycling and repair. their work was relatively discreet and they acted almost unnoticed[52]

Being difficult to ascertain the origin of the practice, many of these are even unthinkable, it can be said that the formal concept of recycling came to Chile for the sectors off of the country - mainly the municipality of Vitacura, Santiago - as an imitation of the concept of recycling was implemented in the city North of San Francisco where the population was starting to separate garbage to the late 70's early 80's. A great detail was that at that time the concept was unknown in the country and the home garbage collection system simply collected them as one more dump without making a difference, only the cartoneros or recyclers (individual people collected them to process them or use them themselves) this situation forced people to get up early to collect them before the garbage truck passed. Already in the 80s and 90s these collectors began to organize among themselves and make agreements with companies, offices or shops, so that they separated the cartons and papers from the garbage in order to collect them. As can be seen, this has always started as an initiative of private individuals rather than by the government, in parallel to the traditional garbage collection system.

With the arrival of democracy in the 90s came a great cultural and environmental change, the concept of taking care of nature and not putting garbage on the street began to be included mainly in schools with children, changes that first led large cities to be cleaner (decreasing the workload of people who work in the toilet and ornament) and moving from children to adults the change in the mentality of the concept takeaway, the educational reform of 1996 reinforced what was started voluntarily by the schools, including as part of the area of natural sciences the concept of caring for the environment, ecological cycles, etc. At the end of the millennium, at least in the capital the concept of vote rubbish on the floor was seen as bad manners and bad manners, in the year 2000 I get a strong migration from the Peruvian fields to Santiago and the main cultural clashes were with regard to the

absence of the concept of non-voting garbage on the street, the discrimination social product of this is just when the aliens took forcibly the concept of hygiene, this could mean that it has generated conflict later in 2010 with the massive migration of Haitians, or Venezuelans currently. The public health on the issue of trash and recycling are embedded in the mentality of the population beyond the capacity, something that shows the first “national register of receiving and storage facilities, and facilities for the recovery of waste in Chile,”[53] that the capacity[54] is less than the will of recycling already in the year 2018[53], in the year 2016 entered into force a new recycling law called the law REP[55] that requires producers to take responsibility for their waste management following the European trends for power recycling..

As can be seen, modern recycling in Chile started on the one hand as an ecological initiative, personal ethics on the one hand and as a family economic livelihood for some people. Then the government promoted from the environmental concept, first in school education. Then the changes of environmental regulations at the end of the first decade of the 2000s and the formal establishment of a ministry of the environment. As can be seen according to the cadaster [53] glass is the most recycled material despite originally being cardboard and paper, and the willingness is greater than the ability to recycle, in economic words, the demand for recycling is greater than the supply of recycling.

#### **4.1.2. Why is glass the most recycled in Chile?**

The glass beyond the economic point, the recyclers were commonly called cartoneros because they were seen to recycle mainly cardboard. Hence the question arises of why glass is recycled more in Chile than traditional cardboard?. (82% of glass recycling in Chile, according to the 2018 catastro[53] of the ministry of the environment and as we see the dynamics of recycling between 1973 and 2006 depends on the material the trends of plastics and glasses were generally the fastest growing[56].

In Chile, disunity is traditional, as the Spanish chronicles, or more modern historians among others the Sergio Villalobos national history prize, point out. The peoples among them the Mapuche in general term acted in autonomous communities that were grouped to celebrate or help, a clear example of union manifests itself in the defense against the Spaniards a war of more than 200 years where each *rehue* or *butarehue* (union of several *rehues* or communities) took different positions.

The recycling of glass was strongly promoted in 1994 due to a public campaign of COANIQUEM (corporation for help to the burned child)[57] that started a glass collection campaign

for recycling as a means to obtain funds and help the environment. Said private corporation attended children in the capital of Santiago, said bell allowed him to open a house initially to receive children from regions to be treated in the capital as Jorge Rojas Zegers relates in 2014 [58] in the commemoration of the 20 years, the glass bell to this day pays for the accommodation, treatment and schooling of children from regions allowing the corporation to go from serving only the capital to serving the entire country. It should be noted that this bell started in popular communes of the western sector of the capital, and this bell calo in the consciousness of the population of the capital. The campaign tactically started with the concepts of location, coaniquem is located in these communes and the collection points were designed to be located according to the convenience of people, analyzing the frequent places, locations of outdoor fairs, agreements to put the containers on the grounds of supermarkets, later in the vicinity of metro stations. Details such as the shape of the containers did not go unnoticed having a unique characteristic unique shape to this day.

Coaniquem is not the only one that manages glass today, due to the concept of freedom of action, but it is the most respected and associated with the concept of recycling, the altruistic purpose of this corporation motivated even the disinterested. Apart from the easy location I generate the idea of I'm going to buy to buy and along the way I take these bottles and leave them for recycling and with that the burned children are helped. This gives it an emotional added value that links the ease of the act with the concept of helping. The hood was focused on a single component and its motivation did not generate questions about whether it was really recycled. In passing, I reinforce the idea of recycling not only for a material but in general.

As they point out in COANIQUEM and in "cristalerías Chile", glass has a technical advantage, with current technology it is possible to recycle 100% infinitely many times[57]

#### **4.1.3. Access to information**

As for Chile, the constitution and the civil code grant guarantees to freedom of information, censorship laws were eliminated in the early 90s, recycling predates the massification of the internet (which at least in Chile can be dated to the early 2000s with the appearance of fotolog and Facebook) or the massification of cell phones at the beginning of the second decade of the 2000s. At the time of 2020 the reach of the so-called social networks place chile as one of the most connected countries, with the majority of connections through mobile phones being these in greater quantity to the population of Chile.

In general terms, the laws regarding the internet and its regulations are slim, the telecommunications laws to be focused on technical aspects such as frequencies and transmission speeds, some of them have already become out-dated.

The internet regulations in general are the international laws, the focus of the networks is only to pursue cybercrimes through the investigative police. During the government of Ricardo Lagos (2000-2006), laws on access to information called the transparency law [59] and the law on the election of high public officials were enacted [60], both laws to make access to information transparent. Each website of a state body has a transparency website in which institutional information is transparent, even showing public employees their names, positions and monthly salaries. It also has links to request additional information required from the public service according to the limits established by law. Thanks to this law, in case the information that should be open is not delivered we can make the claim to the office of the Comptroller General of the Republic, which is open to complaints and queries through the platform of transparency, even lately, comptroller as the consumer service (SERNAC) respond to by social networks such as twitter or Facebook, is also the platform to questions of ChileAtiende to all kinds of questions in order to perform some bureaucratic paperwork.

In legal terms, the terms of each platform are respected, in case of a court order the investigative police (PDI) is in charge by court order to request information or processes to platforms. Cases of leaks of intimate photos in an illegal way, for example, platforms are requested to remove and ban circulation, cases of censored forums or web pages are exceptional, usually linked to major crimes such as human trafficking, prostitution, pedophilia, drug trafficking, etc.

Recycling, reuse, and reduction are promoted both by the state, either in commercial batches or by financing programs that promote recycling and environmental care through the national television council (CNTV), as well as private initiatives in other programs, the dissemination and rediffusion of the so-called recycling initiatives is common.

The fact of censorship is strongly repudiated by the general population and strongly associated with the concept of dictatorship. Access to information is not a problem in general in the country, the problem may be that due to its abundance it is difficult to summarize or modernly distinguish from fake news.

In Chile all the laws are presumed known, although due to their large quantity it is impossible in fact, the digital version of the congress library has PDF documents of most of the laws, but many



of them modify others and this is not well pointed out generating a great difficulty to the understanding of them. It can also be added that although the majority of the population is literate, reading comprehension is not very high due to the failures of the education system. The reasons for this and its consequences go beyond the topic of solid waste and access to information.

Even with its educational deficiencies, free access covers not only the Spanish language but all languages, the mandatory use of English as a second language studied in schools, helps to increase the possibilities of obtaining information.

#### **4.1.4. Taxation and laws**

Although the machinery for the issues related to recycling and renewable energies are free of specific taxes in general terms, if there are additional costs associated with transportation by the Chilean postal system that adds an additional cost by weight of the order. The formation of companies and management touch many laws in tax and financial labor matters that are not easy to apply or understand. The legal modifications of Michel Bachelet's second term (2014-2018) have involved major changes ranging from unions, kindergartens for employees, tax categories and depreciation and reinvestments, exemptions, pensions and a long etc. A great reform was attempted, but its poor implementation implied a strong economic fall and that it did not meet any of its tax collection objectives and to this day is one of the great brakes for the economy in general and in particular also for recycling management as a company.

Now as an individual, the legal opening is fast, but the entry into operation or access to credits depends on many laws that requires a legal analysis before and as a result of some the initial operating costs go up, which makes it difficult to initiate activities, considering that the end of recycling in general terms requires business networks with other productive companies, it is normal to borrow for operation for at least 3 years. If the company manages to win a public tender for a cleaning and decoration service, the respective municipality will pay the company to take care of it, the biggest problem this has links with the general management of household waste an area that has always been very linked to corruption, not only in the time of Al Capone in the Chilean case several mayors of the capital were imprisoned for linked events less than a decade ago. When recycling was separated from garbage collection, recycling was not affected.

In the case of the municipality of Valdivia or others there are public tenders[50], and in general terms even the same company can take care of both, but it must divide its fleet between the vehicles

for the garbage that will go to landfills and those that will take the recycling materials to the recycling companies- which in the ministry's cadaster are called with the euphemism of valorizing companies- .

In general terms, Chile, being a Hispanic country, has a bureaucratic logic similar to the traditional Spanish one, the laws tend to be similar with respect to the rest of the American countries, especially with respect to the South American ones.

According to the Ministry of labor, about 98% of labor lawsuits are ruled in favor of the worker, the latter can present a big problem in the operation of small or medium-sized enterprises, especially due to certain legal abuses that can hinder the operation of recycling companies. In legal matters, the abuse of euphemisms since the first government of Michel Bachelet (2006-2010) complicates the interpretation of laws quite a lot

#### **4.1.5. Private organization (civil society)**

The private organization or civil society as it is called since the birth of liberalism or socialism, refers to society in its concept, the person and the person in relation to others. Personal initiatives and individual wills are expressed there. Individuals are protected and regulated by the laws, in general terms if something is not regulated it is allowed, as long as it does not affect others. Chilean society is not united, it was no longer united in pre-colonial times, nor was Spain. The concepts of union to help or celebrate, are concepts that remain in force almost unchanged, the groupings by certain diverse visions define it, even with a high rate of genetic-cultural or even family homogeneity. The theory of cycles of civil conflicts follows this logic, generational changes also imply changes and rearrangements of groupings.

Diverse economic concepts motivate different types of recycling, reuse and reduction to consumption of goods, obsolescence can be a factor to consider that increase the disuse and the need to dispose of such goods. Chilean society is highly individualistic and consumerist, but at the same time there is a willingness to solidarity. Companies as groups of people also pursue direct and indirect economic benefits, in the latter there is the formation of networks for which cooperation is an alternative.

Recycling is an alternative of corporate social responsibility, which has economic advantages, diversification of sources of inputs, tax reductions, increases the preference of its customers. The case

of COANIQUEM[57][58] was dually seen as an income opportunity to expand its humanitarian action (although it is called a corporation in practice, its work is closer to a foundation or NGO) and in turn encourage recycling. For its partners a source of raw materials for the elaboration of their products and reduction of their demand for inputs and / or costs probably (although the latter, there is no detailed information). Each company or foundation has different motives but they interact to generate a greater good to the same society. Possible synergies are fed back. Seeing that it can be recycled and it is done generates a trust in citizens who are even willing to do it for free or the so-called self-will, since they feel that the social benefit helps the world in general, what in religions would be called the common good.

Societies do not work as machines even the most organized, but by the wills, desires and ethical aspirations. The aspirations of the cardboard collectors in the time of the 80s, may have been related to the economic crisis, but the current motivations, may be economics, morality of doing good to the world, as feelings of integration to something important[56][53]. The marginal economy of the 80s is not the same as the economy by production of the 90s or current time in terms of recycling. The term circular economy popularized in economics has theoretical deficiencies, the implication that recycling has to do with the quality of the good is a great example. Terms like upcycling that involves making a new product better don't make much sense in society. The idea instead of cycles is related to natural cycles and the various forms of these. The concept of zero Waste used more modernly logically is more understood as a goal to achieve that everything is recycled several times[29], this concept in terms of efficiency can be compared to the efficiency of engines or natural cycles that in periods of life greater than human are capable of recycling 100%, especially on a geological scale.

Marketing has been overflowing for years, so stricter laws regarding advertising have been modified, even restricting all advertising focused on children in the media. As a result of the previous debauchery in advertising (including politics with this advertising vision), a consumerist and indebted society has developed, reaching riots on October 18, 2019, the non-fulfillment of expectations both at a commercial and political level currently has a convulsive state to society. The need for recycling has generated awareness, but reducing consumption or reuse has not advanced as expected.

#### **4.1.6. State organization.**

The Chilean state is divided into different scales, Country, Region, Province and commune as formal units of administration and management[61], under a unitary state. The legislative system is

constituted is bicameral. Congress and the Senate since independence. The judicial system is relatively independent consisting of courts of first instance, regional courts of appeal and the supreme court. A fourth state power are self-governing bodies or semiautonomous that are public services slightly dependent on the other three political powers that are the National Institute of Statistics, constitutional Court and Contraloria General of the republic who require agreements for the nomination of its senior officials because they exceed the periods of political choice of a government or executive power. In addition, each Ministry by law must have representation in each of the regions and also certain state services. (According to the Constitution).

In addition to the above, limits are recognized, for example, to the action of mayors to their communes, they can allocate policies to sectors or coordinate with others to make intercommunal plans according to the municipalities law and the themes defined there. The Central government designates funds to regional councils, which in turn can tender for projects or finance local projects.

Obviously, the bureaucracy in certain projects can sometimes involve several ministries, each one has its legal deadlines, according to the so-called administrative law these can sometimes extend the deadlines according to this type of law increasing bureaucratic times. The Chilean bureaucracy follows certain logics of the Spanish and French bureaucracies like the rest of the American countries (except the US, Canada and Jamaica). It is typical the creation of a new state body without eliminating the previous one that had the same functions

In the case of the Chilean state, the governments of Chile since the 90s have signed countless treaties of various kinds, Chile is the country with the more free trade agreements in Latin America, also an infinity of environmental treaties, the latter at the political level generate controversy for having demands greater than current capabilities or leaving legislative powers to foreign organizations. Chile is the first non-developed country to join the OECD and many of its standards are compared or copied from the standards of developed countries even without being. The development of environmental ideas are development goals of the governments of Chile, so to some extent there is a tendency to support initiatives, the problem is that it does not reduce its bureaucracy.

The environmental senses of the Chilean state, as ironic as it may seem, in certain cases are not related to the economy. The ethics between socialist and environmentalist guides its lines, the economic point of view is approached tangentially which hinders certain progress or increase processing capacity.

#### **4.1.7. Benefits of recycling for traditional household waste management**

In the Chilean case, the companies that collect common household waste (garbage), can be municipal or private. In the case of private companies, in general terms, contracts are awarded with municipal companies for periods determined in public tenders. Their contracts determine zones and/or frequencies and associated payments for the collection for the period[62]. As they are fixed monies, decreasing the volume of garbage in general affects them positively, decreasing the load slightly decreases fuel consumption, but more importantly decreases the number of times they must frequent sanitary landfills that companies must generally pay for trucks entered and this, in turn[50], increases the useful life of landfills and increases the efficiency in the treatment of waste and enables better compliance with environmental standards by landfills[61].

In the Chilean, it is possible even to separate use of vehicles, general waste requires trucks and higher fuel consumption, but the recycling collectors even with tricycles[63] or you can use electric vehicles in special cartons or plastic, or vehicles less weight for metals as they handle to carry and not to carry and compact as a truck for garbage [50][61]

Although in this case the organic solid waste is not the objective to be analyzed, the separation of these with respect to general garbage and its separate collection with the same logic of the other solid waste or its reuse also benefits in the maintenance of trucks [62] and in the reduction of polluting fluids that are generally produced in landfills that if there is no adequate treatment can contaminate groundwater [61][64].

#### **4.1.8. Evaluation and mathematical parameterization of recycling.**

It is interesting how the duo of Pablo and Nicolas Navarrete-Hernandez [65] in their analysis in Santiago de Chile establish production and efficiency parameters for their cooperatives of base collectors. Among its parameters there are also child care centers that at first glance is not a directly affected issue, but as previously emphasized many labor reforms escape the fields of action of a company. You can see studies that are based on the CONAMA the bureaucratic commission that looked at the environmental issue before the ministry of the environment, so their theoretical and legal approaches are different. This type of analysis is useful for similar conditions, but for a management of different sources the same level of detail cannot be achieved. Officially in Chile there are no standards beyond the legal terms used. The mathematical models are diverse and when considering qualitative aspects this will present discrepancies in the way of calculation. Even so, the

establishment of routes, volumes, fuel consumption, man hours, collection efficiency and processing efficiency can become comparable. They are interesting to compare, but geographical and legal conditions affect in certain cases strongly.

Certain parameters such as flows cover broader conditions than a mathematical model and that this affects its parameters, the efficiency or fuel consumption can vary strongly depending on the route. A spatial analysis for example the comparison between Tepito in Mexico and Chicureo reinforces the idea that the metabolic configuration of waste crosses geographical and political boundaries in its flows, and land use, urban infrastructure and services are connected [66]. The waste treatment process itself, due to its condition of diverse actors, the sustainability of each one is difficult, although in this study general waste is considered, it even denotes that recycling is another invisible actor that influences traditional management.

#### **4.1.9. Strengths, weaknesses, opportunities and threats of the Chilean system**

The Chilean solid waste management system in general terms is positively valued by both the state and civil society. There is a tendency to separate traditional management from the view of recycling. The tradition of garbage collection systems has a long history, already in the Pacific War when Chile captured Lima between 1881-1884 General Lynch installed the system in this city following the hygiene concepts from the “belle Epoque” period. Its weakness is in the zoning of the areas called environmental sacrifice where the landfills are located that are concentrated with industrial mining tailings zones and prisons that provide their service to the entire region of Santiago.

- The management of legal landfills in practical terms has been relatively good, and the number of illegal landfills has been decreasing, the treatment of waste is in accordance with the legislation and with good standards that give the population the security that landfills despite their inherent problems is better than the formation of landfills where garbage is not treated.
- The idea of the garbage collection system came to be seen as good education and manners and the lack of this is generally repudiated by society. The ideas of environmentalism and separation/classification have reached a point beyond capabilities[53][54]. Laws such as the ban on plastic bags at the national level are even overdue, since several communes started with these practices as ecological initiatives before the central government that has later expanded.
- The trends to the generation of green energies, in Chile are goals, thanks to the natural

resources to the center and south the generation of electricity is mostly hydroelectric, Chile has potential of generation of green energies in the north by the high insolation and winds. Government policies aim to reach 65% by 2030, and without trying to build new dams, and without nuclear energy since seismicity prevents it. The vision aimed at it and socially accepted, in which the electric central interconnected system connecting most of the country

- Business trends for ecological change in general predate the laws, especially in commerce since the seals of ecological responsibility positions them better before their customers.
- The experience in the treatment of glass that COANIQUEM[57][58] started served as an example by bringing together helping society with helping the planet, that was the crucial point to generate the growth of the ecological vision and the idea of recycling

*Weakness.*

- The willingness to recycle is greater than the capacity
- The concentration of processing enterprises in the Capital in a geographically diverse country
- Of the 346 municipalities into which the country is divided, 45% do not have a municipal collection system for recycling, and those with a municipal system range from a couple of containers to home collection[53][54]. According to the Law of Municipalities [67], municipalities have the obligation of the solid waste collection system, recycling has been included in the legal modifications of its functions.
- National consumerism is not only in materials that we are technically able to recycle, so much of that consumption will end up in deposits
- The recycling of organic matter has decreased over time[56]
- Bureaucracy makes processing more expensive and hinders the emergence of new companies and their growth, generating indirect costs
- The cost of electricity in the country are the highest in Latin America due to legal scares more than practical
- The disorganization in the information of both state and non-bank financing alternatives there is access to both national and foreign funds, this information does not arrive properly or is entangled in the various bureaucracies.
- The country is not strong in mathematics or chemistry, although universities develop new materials, they fail to connect with the industry to mass it or incorporate them with certain exceptions.

- Its territorial diversity generates a diversity of infrastructures and conservation states. The area of Patagonia in general is better connected with Argentina than with Chile. The insular Chile is generally poorly connected or its connection costs are expensive and infrequent.

#### *Opportunities.*

- Chile has access to almost all markets through free trade agreements
- The country has access to international funds thanks to its agreements and stability, in the environmental issue its level of awareness is real and its level of corruption is one of the lowest at the continental level (№27) next to Uruguay (№26) and Canada (№13) for 2021. This ensures that the investment, even considering extra expenses, will be used in the environmental objective.
- The current miniaturization of machinery would make it possible to increase recycling inside homes as recycle with organic matter. Technological access
- The geographical diversity and the will of the population (civil society) and the state will, it is possible to serve as an intermediate market for testing new technologies as it is already for mobile phones that then their final versions enter the large markets. Consumerism can be used since the demand for recycling being greater than the supply its market gap can be filled in such a way

#### *Threats.*

- The constitutional change would change everything known, no matter how much they call themselves ecological constitution, if approved the economic conditions will change, the impracticability or contradictions of the so far 499 articles generate many doubts to both foreign and national investors. (We would have more articles at the world level if the draft is approved surpassing India)
- The tendency to increase bureaucracy and postmodernism that not only complicate reading or making new laws, but also incorporate unrelated issues and costs.
- The domination of the country by supranational entities through treaties passing to carry the legality and competences of the courts
- The politicization of the courts of justice, comptroller among others, which are breaking with the definitions and reinterpreting laws generating instability.
- The slowdown of the economy has already stopped several projects of all kinds, without economic certainty the interests rise and makes it difficult to invest in machinery and parts,



both to process and to collect, or repair or build new ones.

- Increases in energy costs

#### 4.2. Examples of Chilean territorial approximation

Of the 345 communes, 55% have recycling management systems [54], although we talk about communal systems, certain cities house more than one commune or there are territories that their management may not cover the entire commune for various reasons. There are different levels of analysis. Each commune has elections every 4 years, every mayor can go for re-election (since 2020 the maximum is three terms). The plans can change when the vision changes or the mayor himself can update the plans and projects when he pleases with agreement to the council of councilors

In Chile, the classification of solid waste in general terms differs between waste by its origin: household, industrial and mining, and hospital[47][48][55]. Then there is their classification by materials, both residential and industrial depending on the material can be evaluated together as separate. Sanitary waste is waste of risk to health, its disposal and collection will be agreed separately, it is not possible neither its recycling nor its deposit in landfill, it must be incinerated with special sanitary measures.

the concept of recycling in Chile is prior to economic visions[64], its conception is closer to the zero-waste concept, recycling depends on the capabilities of processing each material. Risk materials produced by the industry are not considered for the recycling system, they correspond to treatment responsibility at the enterprise level under the environmental impact standards to neutralize. The recycling of certain household appliance products can be considered low risk, such risk corresponds to certain chemical elements contained, their treatment varies according to the product being part of them recyclable and a certain part environmentally treated[62]. The materials of category of the industries that are not dangerous can be recycled complying with the conditions of the municipal system or that of the recycling companies

the system is divided into participating groups in phases. The **collectors**, [50][62] who collect the material to be recycled. the process phase or **valorizing companies** that treat the materials to transform them into raw material or pre-raw material to be sold. the productive industries that employ the processed material. The collection phase can use intermediaries or be direct, it involves people, collectors, municipal service, foundations or others. It should be noted that the processing phase, it is

not mandatory that it is a company, it can also be an NGO or an organized community. this happens frequently in areas where organic matter and composting

Municipalities from the beginning are responsible for making or hiring companies to manage the home collection of solid household waste[67]. The amendment to the law in 2016 legally adds the concept of recycling among their responsibilities, even though they considered separation before the legal modification for ethical or political or practical reasons. For legal reasons, municipalities cannot create companies and since the collection is their responsibility, this cannot generate income since it is a mandatory expense (for this reason the separation or collection by third parties for recycling purposes only helps its administration [67]. In certain cases, landfills imply costs for municipalities, in general terms the cost is per tonnage of garbage per truck, less garbage to carry implies less frequency and cost [62].

Because it is emblematic, the management will be seen in Vitacura, which is part of Santiago with Maipu, Valdivia & Puerto Montt in the south, Easter Island. As each of the 355 communes of the country is managed differently in this regard and there are strong variations at the communal level. The geography of each territory is different including communes in the same city. Santiago is the capital of the country, with strong differences in each of its 48 communes, and variations according to personal political criteria or the passage of time. The richest commune and with the best environmental management is Vitacura in the northeastern sector of the capital, being the commune with the most green areas despite being in a mountainous area. The commune of Maipu historically relevant, agricultural past conurbated to Santiago [51], being the second most populated commune located [68] on the opposite side of Vitacura and unlike this with lower budget and population of medium and low socioeconomic levels both communes are in a Mediterranean climate. the south of Chile is rainy, and least populous communes chosen are the Valdivia, the commune environmentally more developed and qualified as the best municipality to live at the national level in quality of life (2018 and 2019) and the municipality of Puerto Montt in the south which is the limit geographic area to defragmentation of the cordillera of the Andes known as the area of fjords, a commune of the lower population density and production linked to aquaculture in special salmon [69]. Finally, Easter Island is the most remote point of the Pacific Ocean and is part of the country

## **Vitacura**

She is the commune of the city of Santiago of higher income and higher standard of life, commune with more green areas per inhabitant, above the commune was part of the commune of Las condes until it appears in 1981 as an independent commune, but installation of the municipality in 1991. The commune has the highest standards throughout the country, and has served as an example of municipal management since its formation. The ecological theme started in this commune and its order and management serve as an example of imitation for the rest of the communes. Clearly having a type of population of high income and high cultural level, its management has all the resources to experiment, Different initiatives such as eco-points for multiple recycled materials has started in this commune already in 2005. Its Comprehensive Solid Waste Management plan [62] shows us specifically how it interacts with the legal framework, how environmental education is educated and taught in the commune, how it interacts with each type of company, how the cleaning of streets and parks is carried out. In its outline it organizes the responsible and their functions, their classification of the types of materials and which can be recycled in the commune, their statistics of the last 4 years to the date of the ordinance. The ordinance has maps or directions, photos all easy to read, but in back side a lot of discipline.

The communal statistical report of the National Institute of Statistics as of 2021 characterizes the commune according to demographic, social, economic, health, educational, municipal, security and electoral statistics. The information from the 2017 Census and projections for the corresponding year [70] is used. The following table 4.1 summarizes some of these factors.

Table 4.1 – Basic Statics of Vitacura on2021

Vitacura				Region of Santiago	
surface		28.3 km2			
Inhabitants		2017	2021	2017	2021
	total	85384	97695	7.112.808	8.242.459
	male	38402	46908		
	Female	46982	50787		
poverty level		2017		2017	
by income		0.13		5.4	
multidimension		3.48		20	
Natality	1 by 1000	2016	13.9	2016	13.1
Mortality	1 by 1000	2016	5.3	2016	5.3
health center		2020	18	2020	854
schools		2020	19	2020	2922

Students		2020	18136	2020	1384850
business companies		2019		2019	
micro		5982		293470	
small		3872		98853	
medium		680		17032	
Big		523		10076	
not sale or not info		6380		142775	

Municipal revenues in 2019 were 94,512,061 [70] million Chilean pesos, that year the dollar oscillated between 650 and 828 pesos with a high level of volatility due to the unrest in the country that affected its closure was 752.4 pesos at the end of the year.

On the waste management system, both the garbage disposal, street cleaning and recycling the municipality has integrated as a single system, it works in liaison with businesses, citizens and foundations involved

It starts from the theoretical point of view of recycling, without using the term circular economy. Then follows the waste management scheme: prevention, reuse, recycling, energy recovery, disposal. The last 2 correspond to the traditional concept of garbage disposal, while the first correspond to the Zero waste vision since they are dedicated to not generating garbage or recycling waste [62]. In the same section the responsibilities in the subject, cleaning, environmental education and coordination of recycling with companies or base collectors are mentioned [67]



Figure 4.1 - Esqueme of Vitacura's Integral Solid Waste Management

The specific objectives are: To define the management of household solid waste in the commune. Define the management of Clean Point recyclable waste. Define the management of Clean Point hazardous waste. Define the management of waste from the Mini Clean Points. Define the

management of the Civic Center's waste. Determine dissemination and education systems regarding the management of carbon footprint of waste management. List of projects to be implemented regarding waste management.

The legal framework is defined and then a glossary of the concepts used. Then the residues are defined. Organic and inorganic originating from homes, offices, shops and cleaning of public or non-built spaces. The debris is included[62]

Non-hazardous waste is defined as: Organic Waste (food scraps, pruning's and branches); Edible oils; Paper and Cardboard; Aluminum Cans; Glasses; Plastics (containers, bottles and bags); Cardboard for drinks; Metals (aluminum and iron cans, other metals); Debris; Household appliances; Fabrics and Clothing. The Dangerous ones are: Expired medicines; Toner and Cartridge (printers and photocopiers); Batteries; Monitors and TVs[62]

Then each dangerous or non-dangerous item is defined its destination. Fabrics and clothes are donated, medicines by law are burned; batteries, monitors and TV are inertized; organic waste is composted and all other items are recycled.[62]

Waste management, cleaning and education programs are defined. The frequencies and schedules of garbage collection are established and those that produce a volume greater than 60 liters are charged an extra charge. Overproducers are defined as colleges, gardens, restaurants or others greater than the volume, in 2019 this implied extra income of 37 million Chilean pesos (check Table 4.2.) equivalent to 6178 liters per day mainly from restaurants [62]

Table 4.2. – Monthly volume and incomes for overproducers on 2019[62]

<i>Mes</i>	<i>M³ Retirados</i>	<i>Pesos \$</i>
<i>Enero</i>	200,50	\$ 2.588.839
<i>Febrero</i>	182,50	\$ 2.312.336
<i>Marzo</i>	180,50	\$ 2.532.540
<i>Abril</i>	208,50	\$ 2.829.783
<i>Mayo</i>	171,80	\$ 2.861.226
<i>Junio</i>	154,98	\$ 2.917.727
<i>Julio</i>	212,94	\$ 3.585.112
<i>Agosto</i>	197,26	\$ 3.811.139
<i>Septiembre</i>	180,08	\$ 3.406.354
<i>Octubre</i>	212,96	\$ 4.060.267
<i>Noviembre</i>	195,44	\$ 3.548.031
<i>Diciembre</i>	157,52	\$ 3.026.942
<i>Total</i>	2.254,98	\$ 37.480.296

100% of the commune has a home collection system, where the municipality coordinates with the population and establishes the separation into 5 categories of containers collected by neighborhood unit on different days. in the case of pruning, it is coordinated and the truck exclusively collects the material and then destines it to a composting point.

In 2019, of the 2754957 kilos delivered for recycling, a purity of 68.5% was achieved on average, implying 1890276.4 kg recycled annually (a monthly detail is also can be check un figure 4.3.). The average garbage production in the Santiago region in 2014 was 1.2 kg equivalent to 6 tons per day, according to punto-limpio estimates 4.6 tons per day.

Table 4.3. Detail of recycling material and state from collected Material [62]

Mes	Total entregado del reciclaje (kg)	% de pureza	Total Reciclado en kg
Enero	206370	71	147018
Febrero	147250	68	100026,9
Marzo	236097	60	141752.64
Abril	192910	68	130985,9
Mayo	207100	68	140621,9
Junio	221,410	68	150337,4
Julio	215840	65	140296
Agosto	263120	71	186815
Septiembre	213910	72	155405
Octubre	261,130	71	185402,3
Noviembre	273950	73	199983,5
Diciembre	315870	67	211633,9
Total	2754957	68,5%	1890276,4

The destination of each type of material is then established and the company, recycler, church or recipient foundation. in the case of foundations, they obtain income from the sale of this material for recycling, in the detail it is specified with which company the foundations work. In this phase, the books that are also given to greenlibros (a second-hand store that donates part of the profits to a foundation) are separated.

It specifies the management of the cleaning of streets and public spaces and environmental education that for that year 2020 was mainly focused on an organic recycling program in gardens and schools, inorganic recycling program in gardens, program of talks by the clean point (the center of storage) and as these are reduced to the extent that the central government through the ministry of

education implements its programs include work of theatre for children about the environmental theme of the year 2019 the estimated number of people trained in the commune by the programs of talks and trainings was 19931 people, which is equivalent to approximately 22% of the population of the community that has gone through such programs.[62]

Since 2018 the recycling of oils was added for which, each neighbor was given a kit to adapt pet bottles as a container for used oils so that the neighbors then deliver them to one of the 8 collection points, (it should be noted that 4 are municipal buildings and 4 are commercial precincts that were added) it is estimated to 2020 about 3000 families recycle oils frequently because they signed up for this purpose [62].

Finally, there is the measurement of the carbon footprint, for which the municipal administration has been certified since 2015 with the ministry of environment and performs the respective measurement. The respective calculation formula is by emission sources, mainly transport being the CO<sub>2</sub> generator

Table 4.3. Carbon footprint of Vitacura [62]

	2014	2016	2017	2018
Total de Toneladas de CO <sub>2</sub> equivalentes	4.405,9087	5.419,5231	24.403,0007	23.182,3733

The management is continuous and the projects in the same line are increasing every time, in the year 2020 a series of medium and short-term projects are defined, among them the decrease in the frequency of traditional garbage collection, the clean point based on the new law for the sale of waste collected at that point, both projects are defined objectives goals, responsible scopes and activities through forms or tables.

As can be seen the order, scopes, responsible and limitations are the important thing, everything conceptual, more than the numerical values, the latter change according to the calculation method or can also be made up, it is important the constancy in the measurement and in case of major changes the homologation. The measurement of the carbon footprint in 2017 shows a large variation and that was given by the change in the measure which had an impact on the value, apply the carbon footprint of the process of recycling that before there was involved a sharp change in the values, but if there was a negative change as it appeared

In the collection we can establish KMI according to the objectives and types of collection, most are reference not an objective, obviously if the processed volume increases it will be positive, but logically that decreases the purity of the collected material because the new citizens who recycle will make more mistakes in the initial phase which is a logical process

The most important KMI are the volume of material disposed of in landfills, the volume or weight recycled per material, the separation of materials

On the educational issue, the KMI are the number of talks and programs per year, the number of attendees, the number of worm farming containers for recycling per school or kindergarten for the composting issue. Amount of composted material per garden and percentage in terms of what is generated, amount of recycled inorganic material per garden[62]

Municipal environmental certification does not respond to the KMI of the European union in this case but to training of municipal personnel, without it being mandatory for each official to train (allocating budget and time for it)

The issue of measuring the carbon footprint in this case is according to the standards of the ministry of the environment, but in general terms its way of calculation is complicated and controversial.

Other indicators not shown by displacement of the inhabitants are linked to location, this is done to optimize the results and ease of recycling for the inhabitants, distance to clean point, transport to them or route management. The comfortable or comfortable locations go through an anthropological-sociological and optimization study, not a mathematical model.

Scale communal indexes at the national level, in general terms, are not calculable, for example, the carbon footprint is no duplication between what was reported by a municipality and the ministry of transport, even so some information for the construction of these can be provided as waste home of food, or of the restaurants of the commune; or, the amount of companies that are dedicated to the repair or recycling, and the number of garbage generated can also be given, but this can lead to discrepancies with what managed by the landfills. It is important not to confuse the figures of the national management with those of the real action applied in space, both have different objectives, at a smaller scale higher level of detail and variables that cannot be parameterized[61].

## **Maipu**



The second most populated commune of the country located in the western area of the great Santiago, in it is the main temple of Maipu of Catholic confession, said temple is founded where the battle of Maipu was held which can be considered the last battle of the independence of the country, it is a commune of medium and medium low income. The opposite side of Vitacura, unlike Vitacura borders a rural agricultural commune, Padre Hurtado. Maipu was a separate city from Santiago that has been conurbated, just as Santiago has its plaza de armas as a founding center. At the administrative level, unlike the rest of the region, it has a municipal drinking water system and ironically the private company that supplies water to the rest of Santiago has its contaminated water treatment plant in this same commune in the La Farfana subsector that processes and cleans the city's waters to return treated water to the natural system. In this Commune the management of COANIQUEM started its campaign together with its neighboring commune of Pudahuel.

The commune has updated communal statistics in the communal statistical report [68], the following counts some of them:

Table 4.4. – Maipu basic Statics to 2021

Maipu				Region of Santiago	
surface		135.5 km2			
Inhabitants		2017	2021	2017	2021
	total	521.627	584053	7.112.808	8.242.459
	male	250.792	287073		
	Female	270.835	29698		
poverty level		2017		2017	
by income		2,57		5.4	
multidimension		13,22		20	
Natality	1 by 1000	2016	11,6	2016	13.1
Mortality	1 by 1000	2016	4,1	2016	5.3
health center		2020	33	2020	854
schools		2020	200	2020	2922
Students		2020	98415	2020	1384850
business companies		2019		2019	
micro		16191		293470	
small		3484		98853	
medium		338		17032	
Big		136		10076	
not sale or not info		4588		142775	

As can be seen, most of the businesses are at the micro level, if a division is made by the number of inhabitants, each standard is comparatively lower than Vitacura, except birth rate which is lower and mortality which is also lower. Comparatively the municipality of Maipu and the Puente Alto, both of which are home to roughly 600000 people, being the second most populated even its population is more than 12 of the 15 regions of the country, although its surface corresponds to the 135 km<sup>2</sup> a little more than half its rural agricultural area, by which to calculate its density in practice corresponds to 40% of their total area as the rural part of this lightly populated [50]

The municipality [51] in its environmental management plan part starting with environmental education in kindergartens. And as can be seen in this case, waste management is part of environmental management. (This approach varies in each region and in each year, as do the names of these plans.) In environmental management, cultivation programs focused on health are also described, the commemoration of environmental days, training for officials, orchard workshops for children and adults, workshops for the elderly regarding management support, work with traditional cardboard collectors through their 4 associations, location of green points, donations to foundations of the material to recycle, agreements with companies, and a long etc of different activities carried out

In Maipu is performed eco-barrio, unlike Vitacura that are neighbors more independent, in Maipu the neighbors are known and therefore brings them together, and creating projects of different kinds with them directly involved, for example, community gardens, for which the municipality will help them with the bureaucracy to apply for funds to implement irrigation tech[51][50].

In the same current as the change of lighting fixtures, projects were also planned that bring together the municipality, the community of neighbors of certain areas and the ministry of the central government or the management of the municipality when evaluating projects that seek to settle in the commune and seek approval of the environmental impact system [51].

The environmental management program of the year 2016 corresponds to the environmental interests of its mayor Kathy Barriga,[51] since 2021 there is a new administration without a differentiated management program yet, the year 2020 in the annual public account environmental management is reported[50]. Unlike Vitacura, which establishes a management plan, the municipality

gives an account of what has been done. In 2017 the commune of Maipu was the second largest producer of garbage and despite the 2016 report the management was considered insufficient.

The waste management of the year 2020 also considered the creation of eco-neighborhoods, green areas for sports, recycling, citizen participation and installation of exercise machines in squares. Ecological concepts, sport, green areas recycling and citizen participation are mixed. In 2017, the company in charge of solid waste collection was changed [50]. The tender was for 6 years for a monthly amount of 157 million and 160 million plus value added tax (19%). Illegal landfills are removed by contract to 5 years from 2017 to another heavy machinery company. Since 2012, the municipality has maintained a contract with the emerces company for the technical inspection of landfills[50]. The contracts for the maintenance of green areas, street cleaning, cleaning of free fairs all contracts are summarized by means of a technical sheet showing the amounts spent.

On the part of environmental education, the municipality is responsible for the georeferencing of ethical signals and the detection and identification of illegal micro-landfills. Also identified are the overproducers of garbage more than 60 liters 251 first semester 2020 and 259 second semester. This was considering the covid restrictions that involved the closure of 50% of schools and commercial premises [50]. One of the KMI is the restoration of green areas (Check figure 4.2 and Table 4.5.).



Figure 4.2 – Green area's project profile before & after [50]

The values varied due to the pandemic the general trend, product of sanitary measures, the work carried out was 40% of the trend in terms of the construction or improvement of green areas.

Table 4.5 – meter of green areas built or upgrade on 3 years [50]

TABLA 17. Metros construidos y/o mejorados trienio

Año	M <sup>2</sup> construidos y/o mejorados
2018	34.964 m <sup>2</sup>
2019	38.687 m <sup>2</sup>
2020	14.611 m <sup>2</sup>

In the same trend, tree planting and pruning management are considered as an indicator of environmental management. 77% of the species planted are native. Cadaster and evaluation of the state of the trees are also carried out [50].

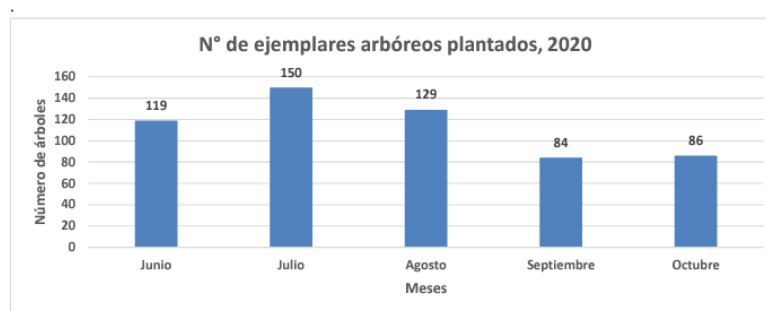


Figure 4.3 – Comparison of tree's quantity planted by month on 2020 [50]

The ecological line is based on an integral sense of the territory, more than circular economy the idea is to generate ecological neighborhoods that have the concept of zero Waste, the community approach and participation of each of the sub territories where all environmental issues are integrated from a practical point of view, the management of community nurseries and composting is part of it. The management of green points where materials are collected for recycling is also under this logic. The sociology students of the Pontificia Universidad Católica de Chile through their Puentes UC program Train the neighbors[50]. Also, the municipality applies to different funds together with the neighbors for management.

The composting management was tendered in 2018 for 2 years, awarded to an environmental consultant. The installation of the photovoltaic panels postulated in 2016 [51] was carried out between 2018-2020 for 4 social headquarters due to reduce the consumption of these with respect to the national electricity central system[50].

Construction of 2 clean points (waste storage for recycling) this work involved 3 state agencies, the department of environmental management, the undersecretary of regional development of the central government and the regional government

The recycling program with the cartoneros called base collectors, 60 of them for the allocation of funds from the ministry of environment to increase their capacity to take care of people and certify them environmentally[51][50].

Certification program of the municipality in the municipal environmental management of the ministry of the environment (SCAM). 5 years after Vitacura.

The amount of funds awarded for environmental issues, climate change or construction of clean points for collection was also each postulated and there is a monthly detail of the activities of each of them.

An environmental education unit is established, [50] whose objectives are environmental Awareness (Ephemeris). ▪ National System of Certification of Educational Establishments (SNCAE) Program. ▪ Ecoeducative Patatur (walking tour). ▪ Sustainable Venues. ▪ Green Bible. ▪ Cultivate Health. ▪ Neighborhood Eco-shops. ▪ Urban Gardens. All under the scheme of figure 4.4



Figure 4.4. – enviromental education in Maipu 2020 [50]

How is shown in the figure, circular economy is only one part of one of the workshops, basically focused on recycling and reuse, it is dependent on environmental management and covering

the process from the goods. The social approach is based on the generation of networks and the way of applying for projects to funds.

The orchard programs follow the following scheme in terms of workshops, their participation measurement shows a great variability

Table 4.6 – Participation on workshops activities[50]

NOMBRE TALLER	LUGAR	Participantes
Reunión para coordinar trabajos Levantamientos de Información.	Plaza Los Cañones	6
Taller Ruta de la Germinación	Plaza Los Cañones	19
Levantamiento de Información		2
Taller Introducción Ed. Ambiental	Huerto Los Cañones	13
Talleres de Huerto	Huerto Los Cañones	11
Taller de Huerto	CESFAM Dr. Carlos Godoy	4
Taller de Huerto	CESFAM Maipú	3
Clase 3 "Producción de plantas y almácigos y reproducción vegetal"	-	37
Taller de Huerto	CESFAM Dr. Luis Ferrada	4
Clase 4 "Lombricultura y Compostaje"	-	37
Taller Bosque Santiago ¿Y a ti que bicho te pico?	-	63
Clase 5 "Riego"	-	37
Acercamiento al programa SNCAE orientado a los EE sin certificación	-	8
Clase 6 "Cambios negativos en las plantas: monitoreo, síntomas y signos"	-	37
Seguimiento y lectura de matriz	Jardín Altaweñi	4
Taller Bosque Santiago Reduce Tu huella	-	60
Clase 7 "Manejo ecológico de plagas y enfermedades"	-	37
Taller de Almácigos	-	8
Clase 8 "Manejos claves para el funcionamiento de la huerta"	-	37
Vista Técnica	-	1
Taller Bosque Santiago "Lombricultura"	-	59
Taller de Huerto	-	2

Unlike the detail of Vitacura all the recycled material is summarized their weight in the table below (Table 4.7}, which separates basically between the removal of municipal and private, differentiated by material, company, foundation or association, as may be observed civil society in the commune recycled 10 times more than the municipality in the year 2020, the municipality recycled 10 times less than your opposite Vitacura, but adding to the civil society, the recycled volume is around 2000 tons close to the management of the richest commune in the country with 6 times more population and a smaller municipal budget and an approximate area of 15 times more.

Table 4.7. Monthly collect to recycling by material and organization in kg.[50]

TABLA 67. Gestión de retiro de Residuos Reciclables - UGAL 2020

GESTIÓN	RETIRO MUNICIPAL				RECICLAJE EXTERNO								SUB TOTAL RETIRO EXTERNO	TOTAL GESTIÓN DE RETIRO
	Puntos Verdes de reciclaje			SUB TOTAL RETIRO MUNICIPAL	CRISTORO	KDM - Fundación Coaniquem	RECYCLING	RECICLAJE CH	RECICLEY	Recicla Futuro	Fundación San José	Empresa Rendering		
MATERIALES MESES	PLÁSTICOS (kg)	PAPEL Y CARTÓN (kg)	LATAS (kg)		VIDRIO (kg)	VIDRIO (kg)	PLÁSTICOS (kg)	PLÁSTICOS (kg)	PLÁSTICOS (kg)	PLÁSTICOS (kg)	PAPEL Y CARTÓN (kg)	TOTAL ACEITE (*estimado en kg)		
Enero	19.008	1.980	1.226	22.214	181.900	16.200	8.756				62.530	16.410	285.796	308.010
Febrero	13.905	2.200	512	16.617	143.000	13.780	9.548				17.615	12.190	196.133	212.750
Marzo	14.337	10.620	465	25.422	122.875	11.480	7.593				16.878	10.010	168.836	194.258
Abril	15.750	4.933	734	21.418	108.325	10.210	5.478				2.880	5.100	131.993	153.411
Mayo	5.002	3.363	207	8.572	90.100	10.386	4.782		1.300		3.280	5.025	114.873	123.445
Junio	2.130	1.668	312	4.110	86.800	8.260	6.347		920		9.910	6.990	119.227	123.337
Julio	4.186	1.801	312	6.299	96.800	15.381	5.870	730	1.560		4.120	6.150	130.611	136.910
Agosto	4.008	3.036	300	7.344	103.400	11.606	6.585	740	1.640		5.340	9.275	138.586	145.930
Septiembre	8.417	7.130	911	16.458	110.300	12.163	7.355	1.610	1.600	2.480	5.360	10.511	151.379	167.837
Octubre	10.170	3.950	844	14.964	125.800	15.800	8.321	1.750	1.404	3.520	6.460	13.435	176.490	191.454
Noviembre	16.896	7.690	561	25.147	125.450	11.200	7.235	1.750		3.455	11.210	14.840	175.140	200.287
Diciembre	8.527	7.286	702	16.515	117.705	12.406	8.560	1.316		4.665	13.235	9.994	167.881	184.396
TOTAL	122.336	55.657	7.086	185.080	1.412.455	148.872	86.430	7.896	8.424	14.120	158.818	119.930	1.956.945	2.142.025

promedio estimativo, no se reporta dato por parte de la empresa

Fuente: Unidad de Gestión Ambiental Local, SDMA – DAOGA, 2020.

## Valdivia.

The city was founded by the first governor of Chile during the Spanish conquest of Chile. A long history is located in the south of Chile, now the capital of the region of the rivers, the city has a past of fortification and defense against the English and was the epicenter of the German colonization that Prussians and Bavarians brought by the Chilean government after the independence to grow and develop the area from an agricultural point of view a couple of years prior to German unification. This influence culturally has great reflections on architecture and culture.

Valdivia was the epicenter of the earthquake of 1960 with 9.5 degrees Richter with 2 tsunamis (although it is more than 40km from the coast) that even slightly deviated the axis of the earth. After that catastrophe it has had a slightly disparate evolution.

The commune has its statistical report for the year 2021 that delivers the basic statistics of communal description, said document is demanded for each commune and they are stored in the library of congress of free access for anyone, [71] some of its statistics are summarized in the following table.

Table 4.8 . Basic Statics from Valdivia 2021[71]

Valdivia	Region of los rios (rivers)
----------	-----------------------------

surface		1016.0 km2			
Inhabitants		2017	2021	2017	2021
	total	166088	178226	384837	407818
	male	80.348	86547		
	Female	85732	91679		
poverty level		2017		2017	
by income		7.64		12.1	
multidimension		14.07		22.2	
Natality	1 by 1000	2016	12.1	2016	11.2
Mortality	1 by 1000	2016	6	2016	6.6
healthy center		2020	69	2020	180
schools		2020	111	2020	467
Students		2020	32635	2020	80173
business companies		2019		2019	
micro		7655		18357	
small		1760		3672	
medium		172		355	
Big		57		115	
not sale or not info		2254		4607	

The protection of wetlands, sea lions and various birds began to be characteristic, the environmental sense is something that marks it. The country has three environmental courts and one is located in said city, its climatic zone is cold rainforest being the commune with more rains in the country, so many wetlands are frequently flooded. Their culture and way of speaking are different from Santiago. With a calmer lifestyle. Even favorite sports are different. This commune being the most ecological commune in the country at the level of thought is more radical, the citizen organization goes more for environmentalism. The thinking goes more for the action than for the calculation of costs. Environmental cooperatives are more common in this region. For example, the organization Valdivia sin basura [72] is a community cooperative that is even responsible for the management of oils, Zero Waste trainings, dissemination talks, collection among others. Their language may be a little rougher to express themselves, but their management is supported by the local municipality and university. As can be seen in its name no garbage is equivalent to saying Zero waste. Their operation has similarities with the California communities in its action, but they differ in their conception. The community vision is greater than the economic one, this encourages the creativity of what to do every time, how to recycle more and how to adapt to geographical conditions when doing so.



Valdivia is a city, but its commune covers different towns that are also served by the municipality, many of which are separated by navigable rivers, the collapse of its main bridge is frequent due to excess traffic for its local level, in general terms there are no major traffic jams.

The management of Valdivia, being the regional capital, is not only framed in itself or ideology, but is also ordered with the regional strategy of the government administration. The keys to this management, on a larger surface scale coordinates the municipalities of different territories, in Lopez-Montesinos [61], by municipal commission this conceptual coordination is manifested in the area. When analyzing the historical evolution, he establishes the following premise “both environmental and economic efficiency can be achieved at a technical level, but acceptability cannot”. This line reveals the fundamental point, if people do not accept it voluntarily, everything will be nothing. Giving figures if they are not understood is useless, if people are not emotionally motivated to do it or make it a habit there is no result.

The hierarchically ordered management of the administration does not help to adapt from the international, to the national and then to the local. All bureaucratic instruments come down in this way, no matter how much the company or municipality acts locally, its interaction with others takes place through the common management instrument. The clarity of the field of action makes it possible to define the other actors with whom one interacts, minimizing the collateral damage of managing one project or company with another. Waste management, for example, affects the tourism industry, knowing how to help. In his communal plan Valdivia does not see how waste management affects special interest tourism or how it interacts with agro-industry or fishing in rural areas, but if we expand the scale, their actions affect them or may be affected by it. For example, plastic waste from aquaculture is material that pollutes, relating to the company helps to avoid that damage and gives a material to recycle.

Unlike other municipalities that have their own municipal or waste management plan, Valdivia integrates with the municipalities of the same region, and all are coordinated on the basis of a communal strategy plan [61]. It generates 61% of the region's household waste, which in 2017 was equivalent to 93,000 tons per year, of which 51% were recyclable materials, 20% organic matter and the rest other types of materials [73]. the problem is that the waste is deposited in the intercommunal landfill of Morrompulli along with other 6 communes, industrial and commercial waste from 14987 companies [61]. Such a landfill does not comply with sanitary and environmental standards.

There is also an unmet demand for recycling points [53][54] that explains that only 0.16 of the materials were processed, by 2021 this percentage rose to 34.7% [74]. According to various sources, the production of household waste per person varies between 1.25kg [73] or 1.2 kg [74] and the same for the national average 1.1 or 1.2.

The general strategies at the hierarchical level are more general than the local plans and their measures are less concrete and more theoretical, basing the concepts and schemes and establishing general guidelines for the municipalities for their coordinated work.[61] the actions and activities do not arise, from a theoretical point of view based on this the municipalities establish their management systems. Due to the heterogeneity of the level and the lack of a plan, a regionalist and not localist environmental vision is denoted. The circular economy scheme is established in said strategy, but in practice its execution is not conducted by the municipality, rather it refers to supporting companies and citizens only maintaining their traditional waste management.

### **Puerto Montt**

The city of is the beginning of Patagonia and the geography of fjords made the south of Chile. Like Valdivia it is a rainy area, but due to its latitude of 40 degrees the strong winds from the west are found. Here in the decade of the 80-90 social housing was built without considering the climatic conditions of the area, the houses were anti-seismic and concrete, which clearly made them unusable due to the rains, that mistake changed the construction regulations and added the local consideration to a very strict technical regulation for being thought anti-seismically, but the Mediterranean conditions of Santiago are far from the area. A technical regulation for very well done the conditions when varying also require changing in this case the laws that forced the same construction throughout the country regarding social housing, in this case the few private construction companies did not make the mistake.

The region is called Los lagos region due to the large number of these, something that can be seen in any satellite image, Puerto Montt its name is due to President Montt, and it is conurbated with the city of Puerto Varas its prime minister, like most of the communes of the country has basic statistics available [69] accumulated in the Library of Congress, the frequency of these reports was irregular and not uniform for all the communes, since 2011 there has been a certain standardization, part of these, the following table shows us at a comparative level.

Table 4.9. – Puerto Montt’s Basic statics to 2021

Puerto Montt				Region los lagos (likes)	
surface		1673.0 km2			
Inhabitants		2017	2021	2017	2021
	total	245902	272555	828708	897303
	male	121019	135422		
	Female	124883	137133		
poverty level		2017		2017	
by income		11.42		11.7	
multidimension		20.34		25.5	
Natality	1 by 1000	2016	15.2	2016	12.8
Mortality	1 by 1000	2016	4.6	2016	6
healthy center		2020	75	2020	402
schools		2020	160	2020	969
Students		2020	57792	2020	182502
business companies		2019		2019	
micro		12146		42539	
small		3398		10493	
medium		470		1226	
Big		237		522	
not sele or not info		3935		11942	

The commune of Puerto Montt is one of the southern communes of the country with a strong regionalism, in general the southern communes have a smaller budget to fulfill their responsibilities and, on several occasions, certain professionals are not under permanent contract. This implies a lack of professionals outside the management of the productive companies in the area, a large part of them not requiring qualified personnel. At the management level from the bureaucratic point of view the municipality and the GORE (regional government) there is not much updating of local documents, all being prior to the founding of the Ministry of Environment and even prior to the division of the region into 2 separating rivers and lakes. The waste management policy was made by CONAMA in 2005 and the operational manual was in 2008. At that date, the concepts of recycling and reuse were already raised and terms such as circular economy were unknown (circular economy is just a way of rethinking the ideas of green economy) This is coincident with the ECLAC survey [75] where it evaluates that 1 in 4 municipalities does not report any regulatory instrument and that one in 3 has not established a budget for recycling.

The regional capital that recycles the most with 39.7% of non-hazardous solid materials in the country, followed by Valdivia with 34.7%., despite having fewer recycling points per inhabitant (1.3 per 10000) [74]. The production of garbage per inhabitant is about 1kg per day practically in the national average of garbage generation. In This city there are several companies that process materials one of them is Goodwood [76], which recycles plastics mainly from the salmon and

household industries through its plastic wood formulas. The company operates under the concept of circular economy and explains its motivations in an interview broadcast on the national channel in an educational program aimed at young people called "Plastic Challenge"[77], this show was financed by European union environment fund.

As can be seen, there is no correlation between strategies or plans or solid waste management proposed and the management actually carried out. Being the commune that recycles the most can be thought that corresponds to an understanding by the population and companies of the need to take care of the environment and their region. The territorial feeling of love for their city and ironically even following the old government lines it is possible to achieve the same or better results, The same Goodwood company stated that its birth was born personal concern to help recycle being a supplier originally of the salmon industry decided to recycle both the products they supplied and other plastics. According to the Cadaster of the Ministry of the environment [53] the cadaster reveals that already at that date the commune had recycling of household appliances. And at the environmental impact level, although most of the projects are related to salmon silage or aquaculture, other projects are related to the industrial management of liquid RILS produced by salmon farming, recycling plant and manufacture of plastic inputs for the aquaculture industry, recycling plant and plastics processing; Sorting plant and transfer station for non-hazardous urban and industrial solid waste, most of them were rejected by the environmental assessment system, but ironically the thematic interest of the projects is relevant.

In Vliegenthart Arntz [64] shows the math in the solid waste in household of Puerto Montt, a book of support for local teachers of second core (children of 7-8 year) shows that if the municipality does not reveal or not has very tidy their statistics approach in education is a priority, such a book was funded by the municipality, ministry of Environment and a company salmon within their corporate social Responsibility. In it the local situation is reported to date it is highlighted that the "Lagunitas" landfill does not comply with sanitary standards (like valdivia, [61]) and that although it is legally owned by the municipality it is under concession and five other communes also vote their garbage there receiving 96182 tons per year 2013 with an estimated annual growth of 5.1%., at that date the construction of a new landfill with the appropriate treatment was expected in the las lajas sector

Among the solutions proposed by Vliegenthart Arntz [64] are not to buy products that harm nature, only those that are really needed (to reduce), prefer returnable to disposable bottles. Reuse,

make manual arts at school with already used broken materials or to promote donations. In the recycling line, 58% was organic material that can be composted, 12.4% cartons and papers, 6.6% glasses and it is stressed that they can sell metals 2.4%, when seeing the percentages, we have that almost 80% of the waste that ends up in the landfill could be recycled. Then, through basic mathematical calculations, the ideas are reinforced.

### **Isla de Pascua (RAPA NUI)**

She is a mysterious place a 163.6km square island in the middle of the Pacific Ocean 3700 km from the Chilean coast, formed by three volcanoes and which joined Chile in 1888. Geographically the island is located on the continent of Oceania. Around 5000 inhabitants live on pandemic situation. A Basic Statics are [78]:

Table 4.10 – Easter Island's basic statics

Easter Island				Region of Valparaiso	
surface		163.6 km2			
Inhabitants		2017	2021	2017	2021
	total	7750	8445	1815902	1979373
	male	3819	4172		
	Female	3931	4273		
poverty level		2017		2017	
by income		8.12		7.1	
multidimension		21.65		19	
Natality	1 by 1000	2016	15.9	2016	12.1
Mortality	1 by 1000	2016	4.2	2016	6.7
healthy center		2020	1	2020	353
schools		2020	5	2020	1208
Students		2020	1601	2020	363851
business companies		2019		2019	
micro		83		77899	
small		52		18516	
medium		22		2245	
Big		6		946	
not sale or not info		133		26425	

The population discrepancy between the projection to 2021 of the Institute of Statistics and how many actually live due to the COVID pandemic, is also affected by a law that limited the population of the island so the traditional calculation methodology was affected, also the fact of being without a tourist methodologically affects the censuses. The PROT (regional territorial planning plan) of the Valparaiso region estimated for 2021 a garbage generation of 1.043 kg per person per day based on the data of the year 2013 of 0.905 kg /person / day [79]. Both waste management, erosion and pollution of aquifers were the environmental problems seen for the island. To which are added the pressure on marine resources, effective deprotection on ecosystems. It should be noted that the

island is a UNESCO World Heritage Site, its indigenous population so both the prot and any action there is limited by heritage and indigenous laws tangentially.

On this occasion we will not analyze its history, although it should be remembered that this island is a factual example of the theories of Malthus since its crises during the period that in Europe can be called medieval its inhabitants predated its resources generating the wars for food that almost destroyed its culture and environment, several trees of the time were extinct. Rapa nui, the native name is in the middle of the Pacific Ocean, still receives thousands of tourists annually, the small island generates 10 tons of garbage daily and 12 tons in the summer, before the collapse by the trash bin has become the alternative more sustainable because the spillway could collapse. The solution started first from the local community and in 2011 waste management began [80], clearly in a small place like this the processing capacity has different conditions from the rest of the country and also the shape. All the separation is done by hand, the materials are quarantined against dengue for a year. They are compacted and then sent to the continent on navy ships, part of the pre-treated waste is also sent by plane through the LATAM air company [81], arriving in 2018 to preprocess more than 35 tons of plastics.

His biggest problem was the processing of glass, the founder of Greenglass [82] on the occasion of talks of entrepreneurs he went to the island and when he saw the problem of glass, he made the arrangements and calculations so that the glass shops buy him and bring the ground glass from the island to the mainland. This same company works on the continent with bottles to make glasses that are sold both in Chile and Europe based on recycling.

In the case of Easter Island as in other islands and coastal areas such as San Andres Island in Colombia [14] or Paranagua [15], the plastics accumulated on their beaches are not necessarily local, as they arrive by marine currents unlike other materials that can be associated with local production. Despite its distant position Easter Island is no exception and is the closest inhabited point to Nemo point (more than 2000 km) that concentrates the garbage of the sea.

#### **4.2.2. Brainstorm from the examples**

In the following comparative table, it is possible to see the recycling perspective of local governments to approach the issue of integral management of household solid waste, whether or not the circular economy concept concurred, and what materials they collect from the inhabitants.

Table 4.11 – comparative between 5 case by material, and approach

Com mune	Regio n	approach	Circular Economy	collect								
				Papp er & Carto oon	gla ss	Plas tics	Alumi nium	Orga nic	met als	appli ance	bater ries	kitc hen oil
<b>Vitacu ra</b>	RMS	WSM Integral	Zero Waste	+	+	+	+	+	+	+	+	+
<b>Maipu</b>	RMS	Education , health Envirome nt	only like part of envirome ntal	+	+	+	+	+				+
<b>Valdiv ia</b>	Los rios	communit ary	Teorical by Regional strategic, Zero Waste in practice	+	+	+	+	+				+
<b>Puert o Montt</b>	Los lagos	Education al	by companie s not by gobermen t	+	+	+	+	+	+	+		
<b>Isla de Pascu a</b>	Valpar aiso	not info	not info in gobermen t	+		+	+	+				

As it is possible to observe, the term circular economy is touched tangentially, it is not an integrated term, most have a Zero waste approach to recycling because morally it is good for the environment, in Valdivia this is expressed directly [73][72]. Recycling either as part of waste management, or as a solution to garbage problems is accepted and promoted, carried out according to budgetary or technical capacity [51][62]. The logic of indicators only coincides in 2 points in measuring the amount of recycled material annually and in promoting environmental education. Now the way of carrying it out in each commune changes, but in all this the relevance of civil society is either training [50][51], collecting or being the recipient of the collected material or its profits. The case of Valdivia the sense of community is promoted by relegating the municipality to the background. The position of Puerto Montt is a discreet work in education [64] and an interest of companies for social awareness of care of the territory or corporate social responsibility. Vitacura is an action efficient use some standards of measurement more than the rest, but do not give them a lot of relevance, because the number is a reflection of what is measured and the passage of time if your needs change certain numbers should go up or down and that's not necessarily the situation, the measurement is not a formula is an expression of a concept and its purpose [62].

Both Maipu [50] and Vitacura focus on georeferencing [62] in all their management both in this issue and in others. The management of Maipu covers several environmental areas but the management for recycling at the communal level is mostly by civil society, and the municipality works on the formulation of projects so that the inhabitants generate more and new management.

Table 4.12 . comparative of index used by local government

Indicator	Vitacura	Maipu	Valdivia	Puerto Montt	Isla de Pascua
kg recycling material collected	+	+	+	not by gov	not by gov
carbon marks	+				
certification	+	+		not by gov	
specific by proyect	+	+			
enviromental formation		+			
enviromental education	+	+	+	" + not standar"	
frecuency	+				
cost	+	+			
green areas	" + not considerate to WSM"	+	" + not considerate to WSM"		
healty programs		+			
compost programs	+	+	+	" + not standar"	
quality of recycling material	+				

All municipalities work at the local level, but coordinate with higher-level government bodies, some use their own management plans and others simply follow the lines of regional strategies.

### 4.3. The Russian Case

#### 4.3.1. Brief description of Russia:

The Russian Federation is a country with a long and complex history, rewritten many times and expanded many others. The current Russian federation is descended from an imperial history, an extensive country the largest on the planet, this Euro-Asian country was the first country that applied Marxist theories during and after its civil war (called the Russian revolution) and the subsequent Soviet Union. The current Russia under its name federation shows traces of its history, mainly referring to the Soviet period. The Siberian Khanate its Asian territory where Tomsk is located began in 1580, reaching the Pacific Ocean in 1639 expanding the original limits of the previous khanate



became known the territory only as Siberia which represents 2/3 of its entire territory and concentrates most of its mineral resources, and gas and oil reserves that the country exploits.

Russia is a multi-ethnic country with an approximate population of 145,558,000 million as of 2021, its official language is Russian with certain co-official languages in some of its territories, its capital is Moscow, which macrocephalically concentrates the majority of the population. The former Capital Saint Petersburg is the second most populated city and unlike the rest of Russia has a clear European structure and culture since its foundation. The vast expanse of Russia gives it a great diversity of climates, especially the cold ones within the classification of Koeppen (Russian scientist widely known for his transliteration into German). Most of its expansions have been in search of more temperate climates or navigable waters in its entire history, which has led it to confrontations especially with Turkey. The Russia of the end of the empire had a strong scientific development that updated it after decades of delay with respect to its rivals, which was not enough to solve its problems, the Soviet era focused on the development of sciences, arts and engineering taking it from being a backward country to a world power in the 1960s. In the decade of the 90s the fall of its economic political model led to the fall and conformation of the current Russia separating from Russia former constituent republics, of which Belarus and the former Asian republics present a strong link and dependence on Russia. Russia, being the dominant country of the former USSR, left with a large part of its legacy and arsenals, as well as with its debts that led it to the period of crisis dominated by mafias. At the beginning of the 2000s, the country began to rebound, mainly linked to the rise in the price of gas and oil and political changes.

The Russian population is considered cultured and with a high level of education, although in turn most of its population does not work linked to their studies. The traditional economic standards applied to Russia demonstrate values not reflected in the daily economy or wages, Although Russia is between 7th and 6th position by GDP its per capita [83] is far from such positions, its money is concentrated in a small group of people that the Russians themselves call oligarchs. Russia has an intermediate Gini worldwide between 36 and 37 coefficient [83], but this difference is only referential has its calculation blind spots as calculation. Most of the productive areas are the poorest areas of the country despite being the producers of resources (what can be called a version within a country of the curse of resources or paradox of poverty, but without the internal social conflict that normally entails).

Although it can be said with great generalizations that the Russians have many cultural similarities, certain regionalisms can be noticed in their population, also a certain ethnic mix, although most of the ethnic groups of Asian origin are concentrated in Asia.

The political and economic system is a mixture of all its periods that is difficult to describe without addressing censored topics. In international aspects, Russia stands out for the sale of commodities and weapons to certain countries [83]. Since Soviet times, it has financed countries that have a certain political interest for the rulers in order to maintain their influence to a certain extent. Currently its largest buyers are European countries with china 14% [83], its export profitability drops sharply with increasing distances due to the icy waters, its large extension and geographical conditions, most of its gas and oil are located in the center of its country and in European areas. In recent years it has increased its dependence on China at a technological level for its population and with a strong technological dependence on European or American countries in terms of components for its industry.

Russia in the last two decades has created various customs, defense or economic organizations with former Soviet countries mainly, although its most important association is with the People's Republic of China both bilaterally, and in the so-called BRICS project that includes Brazil, South Africa, China and India, which has helped it to increase its political weight.

Russian development depends heavily on gas and oil, which are called dirty energies, it depends mostly on being an exporter of them, although internally since Lenin's electrification plan it has a diversity of hydroelectric power plants that are green energies and nuclear power plants. Russia is the strongest country in electrical capacity. Now in terms of technological development, Russia in historical terms has brief periods of strong technological development followed by long periods of low development that lead it to lag behind, the Russian monarchy is a clear example of this, product of the 90s Russia has more backward technological development and in turn due to the poverty of its population a slight technological diffusion, which in turn feeds negatively to massify own technologies. To that added the secrecy, bureaucracy, propaganda and disorder in terms of communications. The concepts such as recycling, reuse and reduction, are concepts understood, but little developed since the Russians themselves distrust that it is done. The 90s strongly affected in terms of increasing the concept of takeaway, but the increase in consumption is not comparable with European or Asian American societies.

Russia is characterized by not being an environmentally concerned country, Russia tends to maintain a traditionalism historically focused on the last centuries, the concept of collateral damage is not widely seen both in environmental and in other areas such as legal. At the legal level, environmental damages are barely seen in its legislation and with fines among the lowest in the world practically non-existent, linked to the price of the ruble and that if initially they were low due to inflation, they go down even more. Russia is a particular country, to hide annual inflation it is common to update its technical calculations by showing inflation in multiples of inflation in times with respect to 1991 or 1997, the date will depend on the manual, this is very particular to Russia, internationally knowing the annual variation is not a problem, but internally the use of this form is daily.

#### **4.3.2. Recycling**

As pointed out by Fedotkina et al [84], waste in Russia since 2003 according to the ministry of natural resources of the Russian federation is divided into Hazard categories, something little occurring, understanding that it is a human risk not a catastrophe (terminological errors there may be here) The terminological error can affect understanding. Categories 4 and 5 have a strange terminological division by having medical waste as low hazardous and at the same level of household waste or debris despite their serious health problems, supposedly the criteria for the environment and health are the criterion of this classification. As the authors themselves point out, this classification is inefficient. Rosprirodnadzor (federal service for the supervision of natural resources) in 2018 pointed out according to the authors that 66% of the waste according to this classification was derived from oil companies and others generally referred to as Residual Industrial Labors (RILS). Russia since Soviet Union focused in recycling process to industrial level more than household level [84][85]

#### **4.3.3. State Organization.**

The Russian State is in constant territorial and administrative change, varying between 6 federal subjects: 22 republics, 9 krais, 46 oblasts, 3 federal cities, 1 autonomous oblast and 4 autonomous okrugs as of 2013, more current modifications can be. It was officially 85 by that date. Russia is called the Russian federation and that implies 8 federations. Corresponding 3 of them to Siberia (Ural Federal District, Siberian Federal District and Far Eastern Federal District) to the Siberian Federal District belongs Tomsk. Most of the subdivisions are located on the European territory.

The government differs between a central government and local governments according to their categories, a recurring theme is the discrepancies between governors and mayors, the former being strongly linked to the central government (a characteristic more typical of centralized governments than federative governments).

The very fact of 6 entities and local, central and territorial governments, some elected others not, generates enormous bureaucracy and conflicts. The centralist influence of the central government of Moscow in general terms has so much weight that it overshadows the capacities of local governments in terms of their management. The more bureaucratic disorder there is generally greater corruption due to the difficulty of management and control. To this are added certain laws that transfer control of institutions to their respective ministries independent of their membership, as happens with universities that go from subtracting laws to skipping them due to their legal dependence.

The parliamentary system is bicameral, in general terms this does not differ much to any country on paper. A State Chamber (called the DUMA) and a chamber called the federation council - which is equivalent to senators and deputies in other types of legislative branches. In theory all laws should be approved in 3 plenary sessions, but if you do not have much choice this is not required. Which explains that in certain cases laws are passed with very high speeds unlike in other countries where laws sleep in parliament for decades. In general Russia has difference between president and prime minister like several European countries.

The judicial system in general defines itself as independent, which generates many doubts in its citizens, the guilt rates reach 100 guilty per acquitted, and low rates of execution of sentences that in 2006 only executed 52% of the trials, the same former President Dmitry Medvedev also pointed out that Russian society was ravaged by legal nihilism in 2007. The judiciary together with the bureaucracy are the biggest problems at the internal level. The different administrative levels and judicial functions added to the constant legal change increase the injustices and ignorance of the law to be applied. The excessive condemnation against civilians and the contempt against companies, the state and oligarchs, make us doubt that justice is fair in the definition of all citizens being equal before the law. There are also defective embodiments or collateral damage when performing the procedures.

#### **4.3.4. Access to Information**

Russia is one of the countries with the most corruption worldwide and the least access to information, according to international assessment agencies. Since 2018, the Internet system has been

under what the Russian government calls state supervision. In practical terms, social networks such as LinkedIn (social network to search for jobs) were blocked in Russia on November 17, 2016, allegedly for protecting the personal information of Russian citizens by refusing the company to stay on Russian servers through the courts of law.

Already since Tsar Peter I Romanov, there is a certain tendency to rewrite history and eliminate the opposition or disclosure of any facts contrary to the official version of the moment. The same crimes of Stalin were revealed by Nikita Khrushchev when he succeeded him as leader in Soviet times. In 2021, a censorship law emerges regarding Stalin and his associations or similarities with Nazism. The year 2022 a new law that prohibits referring to what is happening in Ukraine with penalties of 15 years of prisons. Other communication platforms are also blocked accused of terrorist associations. (This is also strange since associations are groups of people not platforms, any case this is the judge sentences)

This, although it is current and has millions of consequences that cannot be addressed, is not new, the invasion of Finland or Afghanistan occurred in the past now in Russian cities have monuments that remember them (next to the Yekaterinburg military museum for those who fell in Afghanistan). The same city of Tomsk has a museum and memorial to the NKVD against Poland, Estonia, Lithuania and Latvia and Tomsk Russians who suffered from the purges and whose were hidden in their time. The same purges and logics of secrecy among Russians can explain both legal and communicative or technical difficulties. This same document has links that do not violate any law, but at the same time, sometimes it cannot be accessed by technical settings depending on the access point, since when trying to block and doing it wrong they block other sites collaterally.

It should be noted that Russian education, although it has had prestige since Soviet times in multiple areas, in the language field most of the population does not often communicate in foreign languages and there are strong etymological deficiencies since Latin words when Russifying change their etymology on several occasions that hinder the associations of words and meanings generating communication problems. Due to the Chinese influence this language has gained popularity which allows access to the official information of the Chinese government which expands the accessibility of the new generations

George Orwell was inspired by the restrictions of Stalin's leadership to write his book 1984 that came to the epitome of restrictions on information.

A big problem also for accessing and reading Russian documents is the redaction where pages are written only by standards, but that have little and nothing to do with the text, they are only copied and pasted into the texts of the same category. How joking Hird & company [45] “Make waste management public or go to sleep” the public knowledge about this topic its essential.

#### **4.3.5. Laws and Taxation**

Taxation is apparently flat in terms of taxes for enterprise-class, differing only two categories ooo and ip, small businesses such as consulting firms have tax of 40%, which is high, especially considering the small businesses in many countries have legal exceptions or rates lower, with rates as high prices rise more quickly at the country level, the profitability of a company in general increases with its size, if the company is not growing, ended up paying less than if it were a company intermediate. The taxes on products and pensions are also close to 13-20% for which a worker already pays 33% of his salary in taxes and the company raises its costs around 40% just because of taxes. It is not difficult to calculate, but it is very problematic in the issue of starting companies or paying salaries legally. Even large companies have a difference between the contract salary and the black salary. This makes possible many labor abuses to its workers, undue pressures and harassment of workers.

The diversity of laws can generate many problems of interpretation or abuses such as elimination of competition according to political ties, emerging companies need to be protected, but in general terms in Russia the protection is to companies already established generating artificial monopolies. If the government itself has talked about judicial nihilism and the laws are constantly changing, it is difficult to analyze the legislative branch. Also, of the oligarchs who got rich with the fall of the USSR, a few have been prosecuted for corruption and others have not. (Same cause, different results).

In terms of recycling, it is not much difference in practical terms to other small companies

#### **4.3.6. Parameterization of recycling**

Russia in many respects is a unique country in its uniqueness, its geographical and climatic diversity make it difficult to parameterize standards, recycling is no exception. Especially in Siberia, floods and freezing temperatures provide the area with poor infrastructure that constantly needs repairs. Intercity transport in many regions is only possible in winter in a relatively efficient way. For

the same reason the processing should ideally be local and the transport of the already recycled material could be sent by the railway network or automobile roads. Although Siberia is the least populated region, it also has cities with more than 100,000 inhabitants where materials could be processed. Each material or collection should be parameterized with itself, in volumes, frequencies and routes. It is difficult to parameterize the costs even more so if the laws are constantly changing.

#### **4.3.7. Strengths, weaknesses, opportunities and threats of the Russian system**

##### *Strength*

- Russian education from a theoretical point of view is fine, both in engineering, chemistry and electro circuits
- Due to the political system and easy to install facilities quickly as many only depend on the government
- Centralized educational system that allows to impart similar education to the whole country, to increase the ecological approach and recycling, reuse
- Kind and generous people who love their land
- Cheap and massive energy

##### *Weakness*

- Bureaucracy, the legal system and corruption
- Disorganization and constant change of laws
- Tendency to destroy competition in order to form monopolies or oligopolies
- Little clarity in the terms used and classifications in the environmental area
- Tendency to secrecy and leave as classified information that even outside the country is referred to as public knowledge
- Confuse the reduction of purchases with reducing the sales sizes of products.
- Limit their own citizens to create startup.
- Great extension and geographies to cover, being the most depopulated of humans on the one hand and highly concentrated in cities on the European side.
- By bureaucracy loses the greater part of foreigners that comes to studying Russia, and part of its population does not provide you with better pay and working conditions, in the case of foreigners, its bureaucracy and conditions for living in Russia are constantly changing and requires translations ridiculous or signature of documents that are online, and a series of processes without

sense or changes, or changing deadlines. (ironically, there are also problems if they hire many from Central Asian countries that were formerly considered to be from the same country and are the ones that have the most ease to stay).

- Russia has abusive working conditions with its workers and wages close to survival in most of Russia, especially in Siberia, the Caucasus or the borders with Finland that demotivate the population make better the work.

#### *Opportunities*

- Russia has a dependence on China, the same country product of European standards and government will has begun strong reforestation projects and production of more recyclable goods, Russia indirectly has the opportunity to receive goods or send to manufacture machinery to that country
- If the current bureaucracy in the Russian Post is modified, even with its monopoly, added to the train transport companies, the internal forwarding of recycled resources as industrial is possible, something theoretical, but in practice due to bureaucracy it has not worked well.
- The development of fertilizers in Russia has based much on chemical use [83], recycling of organic material could generate a new bin in the line of compost and fertilizers, thereby lowering the pressure in the chemical industry tends to be highly polluting, especially in the waters.[24]
- Almost depopulated Russian villages in general are almost out of opportunities, such zones can receive fertilizer from composting or build new greenhouse technologies with new eco-materials recycling products.
- The development of chemistry and science in Russia was high in Soviet times, the development of agro-production has not developed sufficiently, increasing the indoor it is possible to increase the availability of food, agricultural development in the line of efficient use of food can unite academia with practice. By increasing agricultural techniques, it is possible to partially revitalize villages or dashas.
- Developing the idea of recycling in conjunction with chemical institutes is likely to create new materials with unique properties that can help various types of industry[76][43].
- In general terms, Spanish-speaking countries mostly have a lot of information about waste management systems for free (from legal, social, geographical or engineering points of view), not so much about machines, and information about manufactured products. On the reuse and reduction also, by logic the censorship in these issues is limited more to technical details of the



equipment, it is possible to read both governmental and citizen information for free at least for those countries

#### *Threats,*

- The actual Russian government has become at odds with much of the world, which implies that access to technology has been limited both by the government and by reprisals for its actions. Their actions will develop green technologies[86] even faster in other countries around the world, which will imply a decrease in demand for fuels from Russia [43]. There are already new green hydrogen projects that could replace natural gas that only lack investment, at present Russia is one of the largest producers of gas and oil worldwide, but its customers are the same nearby countries, selling to more distant countries decreases its level of competitiveness and profitability.
- Almost all countries including China [8] are on the ecological efficiency line, if they continue to lag behind, they will lose even more their political weight. The last century has been about gas and oil, but the change of resource is natural[86], currently lithium has increased its demand and Russia does not have it, since its technological / military industry is dependent on this material among others.
- Technological development is increasingly intertwined, recycling is also evolving to process new materials or recover metals, if Russia does not increase its capacity, it is difficult for it to process new materials that are not recycled at the moment, but in the future, it is possible that the techniques will allow processing other products[26][29]. The domiciliary is the simplest recycling, but the logic is based on capacity and aims to process more and more types. The later Russia increases its development, the more difficult it will be increase It [45][27].
- Technological development points to resources that Russia have scarce, in less than 20 years renewable technologies have managed to be profitable and in certain countries exceeds carbon-linked energies in terms of prices, if it continues to become massive, a replacement is likely in the near or medium future,[40]
- The reuse of items can be affected as the overreaction with the current pandemic, which even increased the demand for plastic bags that lasts until today each bread in an individual bag in Russian stores still.
- The biggest threat to the country is more bureaucracy for the hiring of personnel, processes or imports by the government to its citizens

## **5. Tomsk and its waste management**

Tomsk Located in Siberia, an important ancient Siberian city during the end of the Tsarist era is currently the university city of Russia that has the State University, Tomsk Polytechnic which are among the best universities in the country, along with another series of universities of national relevance. Tomsk is the city and regional capital of its Oblast.

Tomsk in location is about half of Russia, it corresponds to the Siberian federation on the western side of Siberia. It was founded in 1604 with its fort, and its name comes from its Tom River, with a population as of 2010 of 522900 inhabitants, located in the southern part of its oblast, on its territory is the largest swamp in the world Vasyugan, which implies added to its climatic conditions has a difficult connection with its oblast, being much of the connection with the north of its territory facilitated in winter with the freezing of waters and soils. Tomsk and its northern part have a large reserve of gas that is extracted.

Tomsk has a mixture of ancient and contemporary buildings, like most Siberian cities, much of the year is covered under snow. To the north it has one of the so-called closed cities Seversk, restricted passage that are associated with Soviet industrial production and sensitive work for such a government, at present it has connections with the city and more flexible restrictions than in that period. The rains are concentrated in the summer period, just as St. Petersburg has its own version of the white nights.

### **5.1. 3R (Reduce, Reuse, Recycling)**

The waste collection system has several actors, at the level of household waste and small businesses there is the regular traditional waste collection system and there are also local recycling initiatives

The collection of waste to recycle them, plastics, glasses and cans, counts or counted (in the last 4 months he stopped doing his job supposedly to make fences around the place where his containers are located [87]. Such orange-colored containers were/are usually located next to some traditional system dumpsters in the city. Both companies mixed everything in one container. There are other particular initiatives of the same time in certain shops or the same Tomsk railway station or the same university library, but they are not systematic, ironically these places are separated by type of subject. The container system is in general of the grate type, and being next to the garbage people tend to deposit the materials with garbage bag or purchase included just like the garbage

The seventh leaf national project (Седмой лепесток.[88]) collects at different points of the city, installing an industrial container to establish an office, said collection point has office operating hours or less (see the photo in the annexes) In place they pay per kilogram of material, (a list of conditions that must be given before delivering the material is excessive and the payment does not even cover the expense of water to clean the bottles at home). Other electronic devices can be added to the 3 traditional materials. The collected materials are sent to partners in Novosibirsk. This point is crucial to generate distrust, The schedules are not intended to encourage the delivery, the cost of opening an office is more than the savings, The processing is not done on location, and the shipping to other generates the question of whether this really does the job or not (this is in general this company have working in Voronezh), the cost to ship to another town to 100km can be high and not-so-eco-friendly by measuring carbon footprint. If they processed on the spot it would give more confidence. Establishing schedules is not good for the persons that come, the convenience to recycle is an important factor to motivate, knowing the causes as well. In the same office the material can be processed in the set schedule and put attached an attached container for people to leave the material ideally in separate containers. But looking the bad experience of next company it's clear why use schedule and not container.

The company clean world [89] is dedicated to the work of recycling of materials 14 years, also paying for the collection of materials, previously had container near the residence of the state university, to a certain extent has been the victim from a legal point of view when he was not allowed to operate during the pandemic, but if to the company's collection regional (the same that is not currently operating). It should be noted that the mayor of the city of Tomsk is prosecuted in court for corruption (clearly not on this issue)

In the line of reuse, the SVALKA commissioned store is a great initiative a store that sells products that people have in disuse to be used by new buyers. Also, the app of sale between people like avito helps with the second-hand market (all this market if it is reused). Other social network as vk had different kinds of second-hand market or it is promoted to give away unused products.

The store 2 bees (две пчелы) for example in the line of reuse sell species and cereals in bulk that makes it possible for each buyer to bring a container that will be reused a large number of times, indirectly reducing the packaging that ends up in the trash.

Most of the recycling initiatives are in the grouping phase where they come to connect with each other generating community, supporting each other joining recycling issues with groups more focused on animal care, ecological activism, environmental education, university educational associations or groups focused on space cleaning (cursor), composting and eco-crops (Grow City) and others.

As can be seen, a lot of citizen initiatives are based on the will of people, unlike the rest of Russian companies do not lie about their products, many companies keep the prices of their products even changing their materials for ecological and hide it, this harms the visibility of the use of recycled materials. Organizations use social network VK, as a typical public page of a small business or personal initiative. The use of social media and their marketing vision is clearly mutually supportive citizen. These types of initiatives are those promoted by the circular economy as priorities are at the top of every scheme, recycling is the point before the end of the useful life of the product, although in if the product can be lost in the process of creating another, so from the point of view of the circular economy recycling is the least efficient.

The emotional point in the association allows the development beyond the action of the government, the same experience taken away from clean world space demonstrates the difference in business vision from monopoly to cooperative and how an artificial monopoly generates problems or harms environmental action or projects or politics.

This year the first Eco festival was held where ecological initiatives were presented, the concept of fairs of this style in Tomsk do not manage to be massive because they are self-organized and without real support from local governments.

In the electronic journal OBZOR [90], they announce a news of the start of construction of an ecotechpark, this at the state level, a large construction for a landfill to process Tomsk waste and treat it thermally and with incineration generate electricity, this focused on industrial waste. Another project at the household level is the government installation of a plastic recycling plant expected by 2023 [91].

More than creating new companies (which is always necessary), it is more efficient to grow those that already exist or support from a state level with dissemination and environmental education in schools, or collection programs in schools that is still non-existent.

In the Ecological line 2 consecutive years the supermarket company Lenta has its temporary promotions that give away seeds and sell mini greenhouses, this type of commercial initiative is in the right line. The development of indoor cultivation that they promote, helps to bring ordinary people closer to crops, an enhancement of this (see photo in annexes) added to the collection of cards for recycling. Both initiatives minimally approach ecology as a concept, which makes people more likely to participate in other initiatives, potentially increasing profitability for existing companies and others that may already arise.

In the line of reuse, it implies giving multiple uses or different uses to the same material (the different use for example goes in the line of innovation). In Tomsk it is common to see in urban parks reused plastic bottles as feeding points for birds or for nests, such a feature is technically a reuse. (clearly there are plastics that do not survive and then become garbage, but their use was widespread and if they are well made or repaired there is an ecological reuse that the citizen does unconsciously.

## **6. KMI comparison between Russia & Chile**

The European Union is not safe from the confusions created by the circular economy, green economies, it is common until now to speak indistinctly of these terms or green growth, this term was normally referred to until 2015 [46] when the use of the term Circular Economy began to be extended in formal areas of the European union to try to encompass the productive model and key monitoring indicators (KMI) have begun to be established originally 10 at the comparison level. In this case, the 11 shown for the French case were used [46]. Such indicators are on a general scale, so it is not directly plans or direct actions that are evaluated. The following table (Table 6.1.) compares these values for both countries where data were available (as such KMI are European, these sources were used mainly from the OECD).

At the planning level, it is important to distinguish the different scales of analysis between strategies, plans and actions directed by different legal instruments and organizations with well-defined competencies and responsibilities. At the territorial level, the coordination of these instruments allows defining indicators for each one that talks with the lower or higher ones[1][92]. At the national level, the monitoring indicators are different on a smaller scale that requires more concrete definitions and more specific indicators that help the specific area of development, these KMI do not go to the action scale that will require different more specific objectives and adjusted to each geographical reality.

Table 6.1 –Russia and Chile by EU key monitoring indicators of Circular economy

KMI EU to CE	Chile	Value	year	Russia	Value	year	Source
Domestic material consumption per capita	+	53	2019	+	17.6	2019	<a href="https://data.oecd.org/">https://data.oecd.org/</a>
Resource productivity	+	0.45US/kg	2019	+	1.47US/kg	2019	<a href="https://data.oecd.org/">https://data.oecd.org/</a>
Material footprint	+	4.3gha	2018		5.3gha	2018	<a href="#">National Footprint and Biocapacity Accounts 2022 edition (Data Year 2018); GDP, World Development Indicators, The World Bank 2020; Population, U.N. Food and Agriculture Organization.</a>
ecolabel	+	internal standar		+			
Number of industrial symbiosis initiatives		not info		not info			
number of companies and local authorities that have been supported by Ademe for the functional economy.		not info		not info			
Food waste	+	9.9kg/day	2019	+	33kg/day	2019	
Household spending on product maintenance and repair (excluding vehicles)							
Landfill tonnage trend	+	8 177.4	2018	+	80 564.3	2012	<a href="https://stats.oecd.org/index.aspx?DataSetCode=MUNW">https://stats.oecd.org/index.aspx?DataSetCode=MUNW</a>
Use of secondary raw materials							
Jobs in repair and recycling							

Both countries try to adapt the European indicators of circular economy, although as can be seen the values between each country to some extents are not comparable values, both by economic scale and by population or geography, this is noticeable in any value that is net as the tonnage of fillings, or would eventually in the number of jobs. But those that are at proportional rates such as food waste ecological footprint of materials or productivity may be comparable. That is, if the logic of the economic pie is better about himself and not about the rest, this is the [92] emphasizes in his analysis for Latin America and the Caribbean, where if used for the comparison between countries

reinforces the concept of circular economy is to enhance respect of self. These indicators can be used at the country level on a smaller scale, but they are not the most useful for measuring internal work.

Each indicator has its own concept, for the same reason at a local and practical scale they can be measured, but they are not the most efficient. At the territorial level there are many geographical factors that are abstracted in the generalization, the location and flows so fundamental in trade and management at the territorial level deliver an approach that allows achieving the objective. Concepts such as efficiency always have a limit where it loses its effectiveness, and it is necessary to balance, the 11 KMI indicated do not see the cultural and educational factor, even when the same concept circular economy emphasizes the importance of it. Compliance or improvement of these indicators does help the circular economy, but complying with or improving them does not guarantee having a good circular economy. The problem with the standards of the environmental issue has always been the subject of discussion, the circular economy is an attempt to change the production model and the preferences of the demand for care for the environment that always has been seen as an externality, and from the economic point of view, traditional is always the most difficult is to calculate the externality and as could not be calculated or not is calculated or estimated as the margin of error formula.

From the point of view of efficiency, it is always possible to establish different KPIs (key process indicators) in the processing of the material, but the Circular Economy focuses on non-parametric or mathematically parameterizable variables since it is based on the popular will and its awareness about the environment to generate an economic culture focused on the environment. ECLAC itself [92] proposes other indicators to achieve the objective, although it starts first by analyzing the importance of the legal framework in implementation.

Russia has several studies regarding symbiosis in industrial production[84], as for example in Maalouf et al, [85], but such a definition of symbiosis is debatable since its behavior is more of political, monopolistic or oligopolistic dependence than positive feedback, so it is more interdependence than symbiosis. From the Soviet Planning there is the industrial agglomeration in clusters and a high degree of recycling at the industrial level more for the obtaining of resources than a definition coming from the circular economy or green economies. In the Chilean case, there are no unified records in this aspect, although due to a cultural tendency in the long term, European standards tend to be copied, which may vary in the future. This indicator especially focuses on the management of waste at an industrial level and also does not distinguish between liquids, solids or gases or, in the



case of landfill retreatment to obtain resources from what has already been discarded. Definitely Russia has a greater state of industrial interdependence than Chile, but defining it as symbiosis semantically gives for discussion, now if we define the relations between household waste management with industry the situation changes.

On food waste, obviously both countries have a medium degree, the reasons in the Chile case are associated with consumerism on the rise since the mid-90s, the Russian case is quite more complex to analyze due to the crisis of the 90s and famines, the Russian population is quite aware of not wasting food, but in turn due to the economic system, constant labor abuses and strong salary reductions by fines, and various types of salary discounts tend to buy products close to their expiration, and also due to the sale of poorly pasteurized or close-to-expiration products or prices and constant reductions in the weights and measures of products it is possible to partially explain the food waste. Food waste is an important issue in the circular economy since it is the easiest to recycle, and organic matter tends to interact negatively with other waste increasing its toxicity[38].

Eco-stamps are a marketing issue to influence consumer preferences and certify institutions to give them a certain validity in the ecological issue, now from a factual point of view it comes to absurdities in these stamps such as gluten-free water stamps in Spain or ecological stamps to Starbucks cups that are not ecological since they have internal plastic so as not to degrade. Such an indicator is of great care each type of seal since in itself they do not imply a real fact or a materialization in the behavior of a company[93].

### **6.1. Alternatives to increase recycling**

In general terms, in Russia there is a problem of division of powers and responsibilities between different government agencies, the excessive dependence on the central government also influences the way act and measure; in terms of the 11 indicators, it is difficult to be measured at the local level to Tomsk, in general terms the central government measures and delivers a value, this strongly influence on the economy circular as it is transformed into a data non-delivery of information. in this sense, a positive change in the circular economy mentality in the population is difficult. The development of the circular economy in this centralized way will continue to be slowly.[27]

Tomsk like other Russian cities has a lot of useless paper that can be recycled, the excessive bureaucracy and excess of papers that are copied because it is the format or because it is requested

not out of necessity generate a lot of paper or where most of the paper is blank, direct contact with hospitals, clinics, offices, universities or simply food businesses or not, which generate papers that are useless. Direct business-to-business contact for this purpose is more efficient as long as the state does not bother. The glass can be obtained with food sales businesses or bars that accumulate them as waste, establishing the collection directly with them can be a good alternative, or even establish agreements with the business to leave a container focused on glass in place so that customers also bring a couple of containers. (Focusing on glass would be ideal but an additional container could also be for plastic bottles) either internal or public could be used to reduce garbage from the same place. Following this type of campaign could be done thinking of Tomsk in stores such as make love pizza publicly (as it coincides with its design) and in restaurants at a more internal level. The glass can be broken so it does not matter its state of cleanliness so much, its problem is only the weight that the container would increase, but it is the most efficient in the sense of using the container.

Plastic in the city of Tomsk, can be collected in the same way by making agreements with gastronomic businesses in conjunction with glasses, the important thing is always that the relationship is between the business and the collecting / recycling company.

Legally it would be a deal between civilians not a contractual deal that with its legality it is not uncommon for any trick to be invented. The business owner X gives the used bottles or used plastics to the recycling company for environmental awareness and the company will only look for them as a personal gift. At the institutional/commercial and not personal level there could be invent legal problems.

Following the case of COAQUINEM, [58] there is a possible association of a fund of solidarity and a supermarket chain with processing companies, where the supermarket gives them a space and then the foundation will sell the material to the company recycler, which would help the company already pays for kilogram and to the foundation to raise funds, the supermarket benefits in the image of corporate social responsibility and environmental management. In Chile, due to its governmental organization, this is done very simply, in Russia it is more complicated, which is why certain supermarkets can only do it locally and others it does not depend on the legal categories (in Russia, the same bank transfers between regions of the same bank commissions are charged as if they were different banks by legal system). This legal point, in detail is the subject of another item.

The cases of Chile at a general level and in the 5 particular cases, demonstrate that in different ways the elementary point is to generate the will in people, that they feel a moral well-being by participating recycling and reusing. The ways or motivations of people will vary, but the important thing is to motivate them, waste management has always been an expense, so the one that is done with the waste is similar to a sunk cost. if people think that their garbage is not recycled, it will not help because of the point of disappointment, so it is important that they know and see where it is recycled. In the Chilean case, recycling is not in doubt that it exists, it is known that it is not enough and more is requested. Using the term downsizing it is important to control the reductions since it generates in mind the idea of downcycling that is to say that recycling delivers poor quality products and both generate refusal to recycle (and preference for foreign industry products)

## **Conclusion**

Although Russia as the Soviet Union managed to be the second power worldwide in the 60s - 70s, mainly due to technological development, motivation of social cohesion (hope in political ideology) and the high price of oil and gas, Russia in its history has been the most backward European empire, universities in Russia appeared hundreds of years after Europe or even after the Americans countries that already before independence had universities. At the government level there are the biggest problems, technological development has not improved much compared to that decade, its production has increased mainly thanks to external technology and commercial exchange.

Bureaucracy and legislation are relevant factors that negatively affect the country, historical rewriting is a constant and often temporary censorship of facts. The environmental issue has never had a great relevance and whether it is treated is apparently or secretly. Even with a high or medium educational level, their tax problems drown their businesses and their oligarchs have no incentive to invest in creating technologies even having the money to invest. Environmental work is a popular initiative and by vocation, but neither its dissemination is sufficient nor are they massive, even so, they do an important initial work.

Environmental awareness in general terms is growing in massiveness (with the theoretical distortions typical of activism) so the very logic of reuse implies the sharing of ideas or ways of recycling. There are many DIY's of how to do things, which although they are not efficient are an initial process to then mechanize it and increase its efficiency. Russia has relatively cheap energy and produces more than it consumes, with which it is possible to increase industrial production quickly, but its current political, economic and social system favors immobility. Foreign funds for ecological development there are a lot of them outside Russia, while inside have competitions that pay you a fraction to realize the project, and then steal the idea, limiting development.

The Chilean experience of a country far from everyone is only useful to the extent that the problems are understood, environmental education is a key to use. The constant disorder, constant change of laws does not lead to great progress. Laws can be improved, but if they are not applied or applied according to the person, what good are they? It is possible to change the fines to a unit of fines that is readjusted for inflation those denominated in Chile UTM (monthly tax unit) with that by setting a value in this unit the price would automatically rise with increasing inflation with which the reduction of fines would decrease over time.

If people see that recycling is real and exists, they will be motivated to participate more with it, the ethical issue of taking care of the environment weighs more than how much they pay you for a bottle, the example of COANIQUEM shows it, when in Chile it was paid per kilo little worked because between cleaning the cans at home and spending on transport to leave the products the result is negative. Now being a volunteer, the cost can still be negative for finances, but people don't think about it. Storing containers separately and in places where it is convenient for people to leave them, such as near grocery stores, is more efficient and convenient. Then cleaning or disinfecting at an industrial level is cheaper and more ecological, that each item individually and even depending on the process may not even be necessary.

Regional autonomies can develop offshored projects responding to local conditions and the central government should support and audit to avoid local corruption. In the Russian state, its divisions or levels hierarchically have many problems in the functions and the central determination of the capital is worth more than any territorial, so then the one who must execute actions is confusing and this always makes the laws difficult to apply, added to this are the constant changes and contradictions. It is not being European to divide into 3 separate containers, the Japanese do it up to 30 times with different collection days for each container. The separation itself means that they can be collected with different filling frequencies or even different companies can operate. Thorough separation helps people to incorporate the concept stronger and easier.

At the municipal level, the most necessary thing is to be orderly, start by ordering and defining its functions well. then propose based on that to start the Zero Waste (its clearer a goal than a complex concept). If its functions are scarce, focus on the diffusion of the Zero Waste concept as an idea or the circular economy. Increase the form of contact with neighbors and at least translate ideas or techniques into Russian to disseminate information about it (make infographics maps or diagrams or others) that help to understand the advantages and clear examples that your citizens can do, what habits they can take to generate less waste, focus on specific tasks and communicate them, and try maybe few things, but in good quality and regular order. To household waste management with circular economy, it's fundamental environmental education, the numbers have to reflect the idea if numbers change its important understand why not only how much because maybe the indicators or formula it's not correct.

To increase the integration of the inhabitants in the circular economy it is important to think that they have a double role, because they are consumers and workers, if they see negatively the

national industrial production, they will generate refusal to cooperate in any initiative they contribute to the industry. It is important to reduce labor abuses and downsizing of product units. Industries are elementary for recycling, but this is the inefficient phase of the circular economy, it is always better to operate in reduction and reuse as business models (service models, secondary markets, or others).

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## Annexes



Photo of industrial container office localization Eco Point Seventh list in Fakel center/s square. Tomsk 17 April 2022.



Photo of industrial container office localization Eco Point Seventh list in Fakel center/s square. Notice the people left bags with the item this reflect no interest by payment. Tomsk 17 April 2022.





Self-made Recycling container in Lenin Avenue near ushebnaya street.

Tomsk 10 Jun 2022



Photo of former container for tomsk recycling that don't separate and was together with regular trash container

Source :

© Babr24

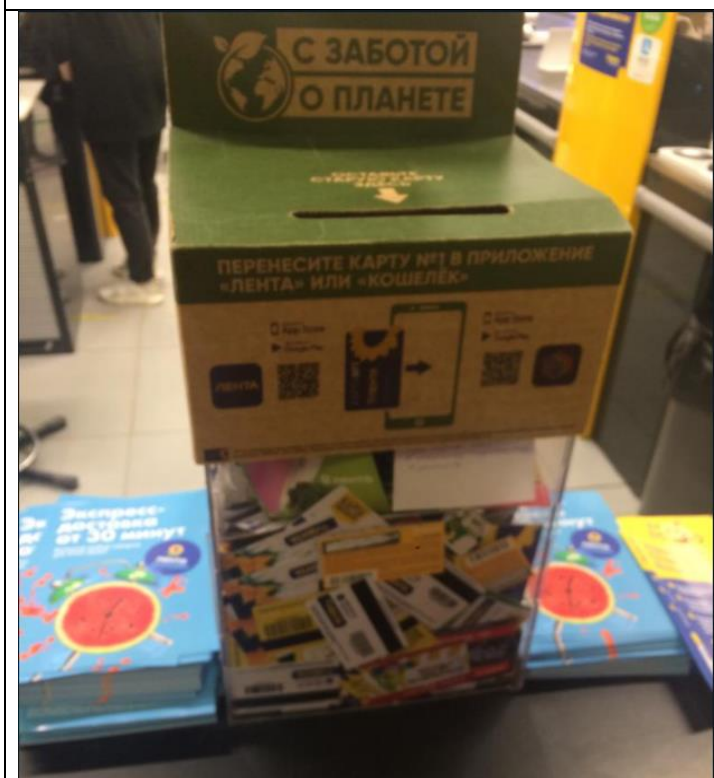
11.01.2022

Василий Звягинцев

<https://babr24.com/tmk/?IDE=223378>



Photo of Lenta sale product of micro greenhouse for spring promotion, with seed gift by amount of sale. Tomsk 8 June 2022



Card recycling container into lenta super market Av. Krasnoarmenskaya with Av. Frunze Tomsk. 17 april 2022

# Отчет о проверке на заимствования №1



Автор: [cssanche@uc.cl](mailto:cssanche@uc.cl) / ID: 10095169

Проверяющий: [cssanche@uc.cl](mailto:cssanche@uc.cl) / ID: 10095169

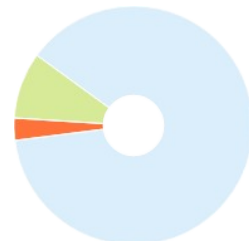
Отчет предоставлен сервисом «Антиплагиат» - <http://users.antiplagiat.ru>

## ИНФОРМАЦИЯ О ДОКУМЕНТЕ

№ документа: 1  
Начало загрузки: 20.06.2022 13:22:47  
Длительность загрузки: 00:00:13  
Имя исходного файла: SanchezBozoCA.pdf  
Название документа: SanchezBozoCA  
Размер текста: 1 кБ  
Символов в тексте: 203836  
Слов в тексте: 30688  
Число предложений: 1299

## ИНФОРМАЦИЯ ОБ ОТЧЕТЕ

Последний готовый отчет (ред.)  
Начало проверки: 20.06.2022 13:23:01  
Длительность проверки: 00:00:43  
Комментарии: не указано  
Поиск с учетом редактирования: да  
Модули поиска: ИПС Адилет, Библиография, Сводная коллекция ЭБС, Интернет Плюс, Сводная коллекция РГБ, Цитирование, Переводные заимствования (RuEn), Переводные заимствования по eLIBRARY.RU (EnRu), Переводные заимствования по eLIBRARY.RU (KkRu), Переводные заимствования по eLIBRARY.RU (KyRu), Переводные заимствования по Интернету (EnRu), Переводные заимствования по Интернету (KkRu), Переводные заимствования по Интернету (KyRu), Переводные заимствования (KkEn), Переводные заимствования (KyEn), Переводные заимствования издательства Wiley (RuEn), eLIBRARY.RU, СПС ГАРАНТ, Медицина, Диссертации НББ, Перефразирования по eLIBRARY.RU, Перефразирования по Интернету, Перефразирования по коллекции издательства Wiley, Патенты СССР, РФ, СНГ, СМИ России и СНГ, Шаблоны фразы, Кольцо вузов, Издательство Wiley, Переводные заимствования



### ЗАИМСТВОВАНИЯ

2,58%

### САМОЦИТИРОВАНИЯ

0%

### ЦИТИРОВАНИЯ

9,01%

### ОРИГИНАЛЬНОСТЬ

88,41%

Заимствования — доля всех найденных текстовых пересечений, за исключением тех, которые система отнесла к цитированиям, по отношению к общему объему документа.  
Самоцитирования — доля фрагментов текста проверяемого документа, совпадающий или почти совпадающий с фрагментом текста источника, автором или соавтором которого является автор проверяемого документа, по отношению к общему объему документа.  
Цитирования — доля текстовых пересечений, которые не являются авторскими, но система посчитала их использование корректным, по отношению к общему объему документа. Сюда относятся оформленные по ГОСТу цитаты; общеупотребительные выражения; фрагменты текста, найденные в источниках из коллекций нормативно-правовой документации.  
Текстовое пересечение — фрагмент текста проверяемого документа, совпадающий или почти совпадающий с фрагментом текста источника.  
Источник — документ, проиндексированный в системе и содержащийся в модуле поиска, по которому проводится проверка.  
Оригинальность — доля фрагментов текста проверяемого документа, не обнаруженных ни в одном источнике, по которым шла проверка, по отношению к общему объему документа.  
Заимствования, самоцитирования, цитирования и оригинальность являются отдельными показателями и в сумме дают 100%, что соответствует всему тексту проверяемого документа. Обращаем Ваше внимание, что система находит текстовые пересечения проверяемого документа с проиндексированными в системе текстовыми источниками. При этом система является вспомогательным инструментом, определение корректности и правомерности заимствований или цитирований, а также авторства текстовых фрагментов проверяемого документа остается в компетенции проверяющего.

№	Доля в отчете	Источник	Актуален на	Модуль поиска	Комментарии
[01]	8,93%	не указано	13 Янв 2022	Библиография	
[02]	0,43%	The Process of Strategic Decision-Making in Libyan Commercial Banks <a href="http://eprints.glos.ac.uk">http://eprints.glos.ac.uk</a>	14 Авг 2019	Интернет Плюс	
[03]	0%	The Process of Strategic Decision-Making in Libyan Commercial Banks <a href="https://core.ac.uk">https://core.ac.uk</a>	30 Окт 2020	Интернет Плюс	
[04]	0,28%	Today's perfect - tomorrow's standard <a href="https://pub.epsilon.slu.se">https://pub.epsilon.slu.se</a>	15 Авг 2019	Интернет Плюс	
[05]	0,21%	Library   Metabolism of Cities <a href="https://prototype.metabolismofcities.org">https://prototype.metabolismofcities.org</a>	25 Окт 2020	Интернет Плюс	
[06]	0,14%	<a href="http://etheses.whiterose.ac.uk/16779/1/Papargyropoulou%20E_School%20of%20Earth%20and%20Environment_%20PhD_2016.pdf">http://etheses.whiterose.ac.uk/16779/1/Papargyropoulou%20E_School%20of%20Earth%20and%20Environment_%20PhD_2016.pdf</a> <a href="http://etheses.whiterose.ac.uk">http://etheses.whiterose.ac.uk</a>	04 Мая 2020	Интернет Плюс	
[07]	0,15%	Urban Metabolism of Intermediate Cities: The Material Flow Analysis, Hinterlands and the Logistics - Hub Function of Rennes and Le Mans (France) <a href="https://doi.org">https://doi.org</a>	30 Июн 2019	Издательство Wiley	
[08]	0,07%	<a href="http://etheses.dur.ac.uk/1923/1/1923.pdf?ETHOS+%28BL%29=(2/2)">http://etheses.dur.ac.uk/1923/1/1923.pdf?ETHOS+%28BL%29=(2/2)</a> <a href="http://etheses.dur.ac.uk">http://etheses.dur.ac.uk</a>	17 Окт 2019	Интернет Плюс	
[09]	0,01%	An analytical framework and tool ('InteRa') for integrating the informal recycling sector in waste and resource management systems in developing countries <a href="https://core.ac.uk">https://core.ac.uk</a>	20 Июн 2022	Интернет Плюс	
[10]	0,06%	<a href="http://users.soc.umn.edu/~knoke/pages/Organizations_&amp;_Networks_Bibliography.doc">http://users.soc.umn.edu/~knoke/pages/Organizations_&amp;_Networks_Bibliography.doc</a> <a href="http://users.soc.umn.edu">http://users.soc.umn.edu</a>	28 Мар 2020	Интернет Плюс	
		Factors Driving the Promotion of Hydroelectricity: A Qualitative			



[11]	0,05%	Comparative Analysis <a href="https://doi.org">https://doi.org</a>	31 Мар 2018	Издательство Wiley
[12]	0,04%	History of waste management - Wikipedia <a href="https://en.wikipedia.org">https://en.wikipedia.org</a>	20 Июн 2022	Интернет Плюс
[13]	0%	History of waste management - Wikipedia <a href="https://en.wikipedia.org">https://en.wikipedia.org</a>	04 Апр 2020	Интернет Плюс
[14]	0%	History of waste management - Wikipedia <a href="https://en.wikipedia.org">https://en.wikipedia.org</a>	20 Июн 2022	Интернет Плюс
[15]	0%	History of waste management - Wikipedia <a href="https://en.wikipedia.org">https://en.wikipedia.org</a>	20 Июн 2022	Интернет Плюс
[16]	0,17%	Система сбора опасных отходов на территории муниципального образования. <a href="http://elibrary.ru">http://elibrary.ru</a>	16 Дек 2016	Переводные заимствования по eLIBRARY.RU (EnRu)
[17]	0,09%	Legal Liability: The main approaches in modern science. Round table discussion number 2 <a href="https://book.ru">https://book.ru</a>	03 Июл 2017	Сводная коллекция ЭБС
[18]	0,01%	A tale of five cities: Using recycling frameworks to analyse inclusive recycling performance <a href="https://doi.org">https://doi.org</a>	20 Июн 2022	Интернет Плюс
[19]	0,02%	<a href="https://economyofregion.ru/wp-content/uploads/2019/12/20_polyanskaya.pdf">https://economyofregion.ru/wp-content/uploads/2019/12/20_polyanskaya.pdf</a> <a href="https://economyofregion.ru">https://economyofregion.ru</a>	17 Ноя 2020	Интернет Плюс
[20]	0,07%	Dissertation	15 Июн 2017	Кольцо вузов
[21]	0,08%	Sociology of Medicine: textbook <a href="http://studentlibrary.ru">http://studentlibrary.ru</a>	26 Янв 2018	Медицина
[22]	0,09%	Катышева, Оксана Владимировна Эволюция внешней политики Мексики в период 2000-2018 гг. : диссертация ... кандидата исторических наук : 07.00.15 Санкт-Петербург 2019 <a href="http://dlib.rsl.ru">http://dlib.rsl.ru</a>	19 Авг 2020	Сводная коллекция РГБ
[23]	0%	Cultural Responses to the War on Drugs: Writing, Occupying, and 'Public-ing' in the Mexican City <a href="https://doi.org">https://doi.org</a>	18 Янв 2021	ПЕРЕФРАЗИРОВАНИЯ ПО КОЛЛЕКЦИИ ИЗДАТЕЛЬСТВА WILEY
[24]	0%	The food waste hierarchy as a framework for the management of food surplus and food waste (2/2) <a href="http://eprints.whiterose.ac.uk">http://eprints.whiterose.ac.uk</a>	28 Авг 2016	Интернет Плюс
[25]	0%	Waste Political Settlements in Colombia and Chile: Power, Inequality and Informality in Recycling <a href="https://doi.org">https://doi.org</a>	23 Янв 2021	ПЕРЕФРАЗИРОВАНИЯ ПО КОЛЛЕКЦИИ ИЗДАТЕЛЬСТВА WILEY
[26]	0,04%	Ворончихина, Дарья Николаевна Политико-правовые аспекты обеспечения экологической безопасности в Арктической зоне Российской Федерации : диссертация ... кандидата политических наук : 23.00.02 Санкт-Петербург 2020 <a href="http://dlib.rsl.ru">http://dlib.rsl.ru</a>	16 Июн 2021	Сводная коллекция РГБ
[27]	0,1%	Governors matter <a href="https://doi.org">https://doi.org</a>	31 Июл 2017	ПЕРЕФРАЗИРОВАНИЯ ПО КОЛЛЕКЦИИ ИЗДАТЕЛЬСТВА WILEY
[28]	0,09%	African Urbanization: Assimilating Urban Metabolism into Sustainability Discourse and Practice <a href="https://doi.org">https://doi.org</a>	31 Окт 2017	ПЕРЕФРАЗИРОВАНИЯ ПО КОЛЛЕКЦИИ ИЗДАТЕЛЬСТВА WILEY
[29]	0%	Electroencephalography <a href="http://emil.ru">http://emil.ru</a>	21 Дек 2016	Медицина
[30]	0,05%	Еремеева, Наталья Владимировна Воля и разум, свобода и необходимость в реформационном учении Мартина Лютера и в этике Иммануила Канта : диссертация ... кандидата философских наук : 09.00.03 Санкт-Петербург 2019 <a href="http://dlib.rsl.ru">http://dlib.rsl.ru</a>	19 Авг 2020	Сводная коллекция РГБ
[31]	0,03%	Spatial Concepts of Lithuania in the Long Nineteenth Century <a href="http://bibliorossica.com">http://bibliorossica.com</a>	21 Янв 2020	Сводная коллекция ЭБС
[32]	0%	196244 <a href="http://e.lanbook.com">http://e.lanbook.com</a>	10 Мар 2016	Сводная коллекция ЭБС
[33]	0%	Погосова, Зинаида Михайловна диссертация ... кандидата юридических наук : 12.00.08 Москва 2010 <a href="http://dlib.rsl.ru">http://dlib.rsl.ru</a>	раньше 2011	Сводная коллекция РГБ
[34]	0,08%	Authority and Participation in a New Democracy: Political Struggles in Mapai, Israel's Ruling Party, 1948-1953 <a href="http://bibliorossica.com">http://bibliorossica.com</a>	26 Мая 2016	Сводная коллекция ЭБС
[35]	0,08%	Санноро: утилизация отходов. <a href="http://elibrary.ru">http://elibrary.ru</a>	06 Янв 2018	Переводные заимствования по eLIBRARY.RU (EnRu)
[36]	0,08%	Civil Code of the Republic of Kazakhstan - "Adilet" ILS <a href="http://adilet.zan.kz">http://adilet.zan.kz</a>	04 Окт 2017	ИПС Адилет
[37]	0,05%	A Basis for the theory of medicine <a href="http://emil.ru">http://emil.ru</a>	28 Апр 2017	Медицина
[38]	0,06%	<a href="https://spu.fem.uniag.sk/mvd2018/isd2018_proceedings/isd_conference_proceedings.pdf">https://spu.fem.uniag.sk/mvd2018/isd2018_proceedings/isd_conference_proceedings.pdf</a> <a href="https://spu.fem.uniag.sk">https://spu.fem.uniag.sk</a>	03 Фев 2022	Интернет Плюс
[39]	0%	276902 <a href="http://biblioclub.ru">http://biblioclub.ru</a>	20 Апр 2016	Сводная коллекция ЭБС
		<a href="https://library.oapen.org/bitstream/handle/20.500.12657/48284/978047">https://library.oapen.org/bitstream/handle/20.500.12657/48284/978047</a>		

[40]	0,07%	2902460.pdf <a href="https://library.oapen.org">https://library.oapen.org</a>	16 Мая 2022	Интернет Плюс	
[41]	0%	Яблоки раздора: Архив Васи́ла Ле́вски на сегодняшний день и создание болгарского национального героя (Bones of Contention: The Living Archive of Vasil Levski and the Making of Bulgaria's National Hero) <a href="http://bibliorossica.com">http://bibliorossica.com</a>	26 Мая 2016	Сводная коллекция ЭБС	Источник исключен. Причина: Маленький процент пересечения.
[42]	0%	Нечаев, Александр Васильевич Неоиндустриализация России: стратегия технико-экономического развития : диссертация ... кандидата экономических наук : 08.00.01 Санкт-Петербург 2020 <a href="http://dlib.rsl.ru">http://dlib.rsl.ru</a>	07 Сен 2020	Сводная коллекция РГБ	Источник исключен. Причина: Маленький процент пересечения.
[43]	0%	Ветрова, Мария Александровна Обоснование стратегических и операционных решений предприятий в условиях перехода к циркулярной экономике : диссертация ... кандидата экономических наук : 08.00.05 Санкт-Петербург 2018 <a href="http://dlib.rsl.ru">http://dlib.rsl.ru</a>	30 Мая 2019	Сводная коллекция РГБ	Источник исключен. Причина: Маленький процент пересечения.
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