

Waste Marketing in North Lima

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Abstract: With the purpose of evaluating the financial gap in the environmental valuation of recycling materials in Lima Norte, surveys and interviews were conducted determining that the product that demands the greatest interest of the productive chain of local recycling is plastic for its cost and quantity. The results were: 1) who receives the highest income is the exporter PEN 6,850.00. 2) The traceability of marketable waste has not been established by informality. 3) The low participation of households makes it difficult to create a structured recycling market. 4) The lowest levels of the recycling chain called: Micro and Small Business (MYPES), if they can access loans without the need for land titles. 5) The sustainability will be possible with: Articulation of productive development, formality and investment of people. It is concluded: 1) the start of the formality policy should begin by applying recycling rates and extending the Extended Producer Responsibility (REP). 2) The cost of formalization does not explain informality. 3) Marketing volumes should be strengthened, considering the inverse demand curve. 4) There is an environmental valuation because the polluter pays principle does not apply. Therefore, it is recommended that the mutual benefit approach should prevail.

Key words: financial gap, formalization, recycling, plastic sustainability, environmental assessment

1. Introduction

For De Soto (1986), Informality is "... to be free from tax burdens and legal norms, but also implies not having the protection and services that the state can offer". This definition has gained popularity, since its conceptual strength allows us to concentrate the analysis on the causes of informality rather than merely on the symptoms of informality. On the other hand, the concept of anomie is understood as failure, disorganization, maladjustment of the behaviors; Therefore, "one should not try to adapt society (reality) to theory, but the latter must come from theory" [1] (Zevallos, 2003). In Peru, debates on anomie focus on disjunctives: the normal and the pathological; Organicity and solidarity in Peruvian society. In any case, these refer that to touch on this issue it is necessary to consider the different ways of understanding anomie: 1) as the actions of individuals that are not governed by clear and imposing rules; 2) as the fundamental disarray of the relations between the individual (individuals as such) and society; 3) as the gap that the social structure imposes when it promotes certain values or norms of conduct that cannot be realized due to the reduced opportunities that society offers.

According to the Lima Regional Plan of Concerted Development (PRDC) (2012-2025), Lima Norte districts are: Ancon, Carabayllo, Comas, Independencia, Los Olivos, Puente Piedra, San Martín de Porres, and Santa Rosa).

According to the Report of the 16th Ministry of the Environment (MINAM) Annual Meeting on Solid Waste Management, in 2016 the municipal solid waste total generation at national level was 18,131 tons/day, of which 12,692 tons/day (70% are of home origin) and 5,439 tons/day (30% are of non-home origin).

According to the Lima Metropolitan Municipality (MML), 2014, in the Integral Plan for the Environmental Management of Solid Waste (PIGARS),

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total municipal solid waste generation in the city of Lima was 7,452.67 tons/day (74.4% Household origin) and 1,907.66 tons/day (25.6% are of non-domicile origin). The total generation of solid waste of municipal origin in Lima North was 2,132.23 tons/day, of which 77% are of domiciliary origin and 23% are of non-domiciliary origin.

The national average per capita generation (GPC), to the year 2014, was 0.61 kilograms/population/day; the average household CPG of the city of Lima was 0.65 kilograms/population/day; and the average home GPC of North Lima was 0.65 kilograms/population/day.

The physical composition of household waste in the districts of North Lima reflects that there is a greater generation of organic waste, followed by plastic, paper and cardboard.

Under the premise that "... recycling contributes to the protection of the environment and its various components and constitutes the technological alternative for municipalities ... that must meet the need for solid waste management in an economical but environmentally safe way" [2] (Huiman, 2013), it is important to know the reasons why the recycling of materials is carried out under informal mechanisms.

According to Ruiz (2010) [3], the recycling chain is a succession of actors united by the same activity, these actors operatively form a pyramid formed by: (1) recyclers, (2) collectors, (3) wholesale intermediaries with registration of trading company Solid waste or marketers, and (4) industries and exporting companies. It is essential to analyze this pyramid to understand the recycling activity in North Lima.

Poulsen (2014) [4] postulates macrofactors such as product lifecycles and information available to the consumer to make recycling a profitable and therefore attractive business activity; Provided that the informality is eradicated. It also points out that local governments "... are responsible for establishing policies and measures for the environmentally sound management of solid waste in their respective jurisdiction ... they must regulate the activity of recyclers as part of their functions"; However, this is not fulfilled and the need to structure and evaluate the organizational system for waste recovery persists.

Until the year 2016 the relationship between the local governments of North Lima and the actors in the recycling chain was unknown. In this context, the relationship of the population with these actors or the role they play in the recycling chain is not clear either.

Therefore, it is necessary to identify and describe the system of organization that is currently being developed in the districts of North Lima for the recovery of inorganic waste tradable. This is in order to contribute to the design of an inclusive management model for the sustainable development of recycling activity in North Lima. It is assumed that the information on the recovery of marketable inorganic wastes will allow us to know the systems of organization. This is because the local governments of North Lima cannot develop a joint work with the actors involved in the recycling activity in their jurisdiction because of the resistance of insertion of public policies within the framework of existing regulations, because it suffers from lack of Data and information, because there is sectorial disorganization, because there is disobedience to authority and because there is a lack of evidence control; this causes impacts on the strategic and sustainable vision to formalize the recycling activity and contribute to local sustainable development with a negative impact on reducing the effects of climate change, within the framework of national targets.

2. Material and Methods

Data collection techniques were developed between January 2015 and December 2016: (1) Surveys: The probabilistic sampling method with the simple random type was considered for all the players in the recycling pyramid. (2) Interviews: Open and simple to the authorities and actors in the recycling chain.

The research addresses the need to know how the recycling activity is developed, its causes and the trend.

In a similar way it postulates mechanisms to make it economically sustainable.

- 1) Object of interest: The activity that describes the recycling chain.
- Scope: The districts that make up Lima North, in the framework of the PRDC of Lima (2012-2025), and of the PIGARS of the city of Lima (2014-2025).
- 3) Time: Considering the period between 2015 and 2016.

3. Results and Discussion

The physical composition of household waste in the districts of North Lima reflects that there is a greater generation of organic waste, followed by plastic, paper and cardboard.

According to the surveys and interviews conducted, the sales value of inorganic waste tradable in North Lima shown below:

Table 1	Physical	composition	of	household	solid	waste	in	North	Lima.	Source:	Comprehensive	Plan	for	Solid	Waste
Manager	nent for N	Metropolitan 1	Lin	na (2014). [5	5]										

N°	Districts	Organics (%)	Plastic (containers, bags) (%)	Card board (%)	Paper (news, bond, wrapping) (%)	Glass (general, bottles) (%)	Cans (containers, lids) (%)	Scrap (metals) (%)	Others (%)
1	Ancón	43.90	9.00	3.00	6.30	1.90	Nd	2.20	33.70
2	Santa Rosa	42.06	10.83	3.87	8.54	8.77	2.35	0.62	22.96
3	Puente Piedra	60.40	7.20	1.60	5.30	1.20	Nd	2.00	22.30
4	Los Olivos	66.82	7.42	1.71	5.20	2.36	1.30	0.25	14.94
5	San Martín de Porres	46.04	5.21	1.13	2.19	1.37	Nd	0.04	44.02
6	Carabayllo	37.30	9.41	2.75	7.25	2.78	Nd	2.76	37.75
7	Comas	69.10	5.05	2.64	3.13	1.58	Nd	1.48	17.02
8	Independencia	40.47	3.41	2.10	2.18	1.86	2.17	Nd	47.81
	Total	50.76	7.19	2.35	5.01	2.73	0.73	1.17	30.06

Table 2 Relation of organic residues vs. inorganic residues in North Lima. Source: Comprehensive Plan for Solid WasteManagement for Metropolitan Lima (2014). [5]

Waste according to origin	%	t/day
Organic waste	50.76	(832.39
Inorganic waste (plastics, paperboard, paper, glass, cans and scrap)	19.18	314.53

 Table 3 Relation of organic residues vs. inorganic residues in North Lima. Source: Comprehensive Plan for Solid Waste Management for Metropolitan Lima (2014). [5]

Waste according to origin	%	t/día
Formal Collection Chain	2.3	(7.23)
Non Formal Collection Chain	16.7	356.08

Table 4Average daily sales value, recorded in PEN * t, for each player in the recycling pyramid (period: July 2015 - July2016).

No.	Recyclable materials	Recyclers Associations	Retailer	Wholesaler	Exporting industries and companies
1	Plastic	720.00	836.25	1,500.00	2,000.00
2	Paper	658.75	888.75	1,000.00	1,350.00
3	Glass	511.25	631.25	881.25	1,500.00
4	Metal	893.75	1,025.00	1,400.00	2,000.00
Total		2,783.75	3,381.25	4,781.25	6,850.00

Note: 1 US \$ = PEN 3.5, as of December 31, 2016.

Understanding the formality as the fulfillment of the normative requirements (to have records or receipts of payment for the commercialization of waste) and the guarantee for the interrelated actors to have protection of the services that the state can offer. The results of the daily marketing opportunity are as in Table 5.

That is, daily there is the opportunity to boost the treasury of North Lima with PEN 2,775,072.00 from the recycling activity.

The survey applied resulted in the questions: What is the recyclable material that, for you, has the highest demand in the market?, the answer was plastic in 98% of the respondents; And when the values of the materials decrease, you which material always seeks to recover?, the answer was the plastic in 90%; Therefore, it was determined that the product that demands the greatest interest of the productive chain of the local recycling is the plastic. That is, it can be affirmed, that it governs the characteristics of the activity for that geographical space. The other elements complement the recycling but do not determine it.

It has been proven that plastic recycling does not have a flat fare, because there are no fixed amounts of prices at any level of the recycling pyramid, this is dynamized based on external factors.

The activity of plastic recycling in North Lima, developed as a collective system, but who controls the formal chain is the exporter, and who controls the informal chain is the collector; The first because it markets pellets (small concentrations of resin) as raw material or input similar to an oil commodity, and the second because it allows to increase the volume of

Table 5Daily monetary opportunity to sell potentiallyreusable waste in North Lima (period: July 2015 - July2016)

Type of collection	t/da y	Sales value in PEN * t	Opportunity to sell reusable		
			waste		
Formal Collection	49.0_{4}	6,850.00	335,924.00		
	4				
Informal Gathering	356.	6 850 00	2,420 148 00		
	08	0,830.00	2 439,148.00		
Σ of potential reused	405.		2,775 072 00		
waste	12	-	2 113,072.00		

materials that will be marketed. Many consumers only think about oil prices in the context of how they directly affect the personal economy, however, oil is one of the cornerstones of the world economy and its price is very important for companies of all types such as polyethylene, Therefore its treatment should be as a commodity, considering that the price of oil can affect a variety of companies ranging from retailers to manufacturers of plastic (petroleum by-products are an important component of plastics). Therefore, it is important to evaluate how many of these products end up on supermarket shelves and are employed in one way or another by businesses belonging to multiple sectors.

According to the marketing system established in Lima Norte, the one who receives the highest income is the exporter. In order for the situation to improve in the lower levels of the recycling pyramid, the members of the society can cooperate with the active participation in the Environmental Incentive Program for companies or institutions in general that have decided to implement: Segregation of Solid Waste at the Source, (2) participating in the Program of Formalization of Recyclers and Selective Collection; In charge of the corresponding Municipality, which must regulate the incentive by municipal ordinance, (3) and apply the principle of polluter-payer.

In Lima Norte, and in general in the country, the traceability of marketable waste has not been established, due, among other factors, to the prevalence of informality. The opportunity to learn about the history of the commercialized, the location of the markets and their dynamism and the trajectory of the materials for the identification and subsequent strengthening of recycling would allow the development of a recycling value chain. Another difficulty was that the quantities of commercialization were not registered or documented, a factor that would allow the authorities and the private sector to make better decisions and to guide public policies more efficiently, that is to say, private business recycling its

secret business. The informality of the activity is developed under the precept that "information gives power".

According to Martínez (2008) [6], "... the stratum that consumes the most electric energy, generates greater volume of urban solid waste, which should be taken into account to consider establishing the municipal collection rate by collecting household waste, proportional to the consumption of electric energy. The domicile that generates the largest urban solid waste should pay more, applying the polluter-payer principle". Therefore, it is important to consider the effective cost demanded by the services of selective collection of waste, according to their type, because the criteria for collection are determined based on objective criteria, taking into account the number of taxpayers of Location and number of lots; Consequently, the contributory capacity must be taken into account, insofar as the rates cease to be the justification of the tax and rather represent an objective factor to graduate the assumption of the cost of the service by the taxpayers, hence The value of the property, an indicator of the contributory capacity, proves to be a valid criterion.

The sustainability of the recycling activity in North Lima will be possible to the extent that it coexists: Articulation of productive development, formality, and investment of people.

Between local authorities and the informal and formal private recycling supply chain is a win-win approach.

4. Discussion

According to De Soto (1989) [7], the argument is that informality is a product of formalization high cost, under the premise "... the ultimate goal of a property system is not to define elegant statutes, to connect glowing computers or to print multi-colored maps. The goal of formal property is to put capital into the hands of the whole country". Also De Soto (2000) [8], supports the thesis that if the poor formalized their property, they would have access to credit and that would allow them to progress and remove countries from underdevelopment. Alcázar and Jaramillo (2012) [9], undertook an investigation with 600 informal micro-enterprises and offered to pay them everything that was difficult for them to become formal and help them with the formalities. That is, he tested De Soto's theory. "It turned out that a huge majority (three out of four) of micro-entrepreneurs was not interested in being formalized, except for a minority who wanted to put up posters to attract clients but feared that they would be inspectors to supervise them. On the other hand, has two very marked conclusions that contrasts the De Soto thesis, first conclusion, regarding the necessity of the mortgage in the access to credits MYPES "It is not necessary a title of access to access a credit And less constitute a mortgage"; and second conclusion, regarding the success of the formalization of the property in relation to the concession of credits for MYPES: "The chain of generation of capital proposed by De Soto was truncated because it has been demonstrated that the formal property cannot become money in effective and therefore neither in investment nor in living capital nor in economic development". Finally, La Porta & Shleifer (2014) [10] carried out research in 105 countries, finding that the cost of formalization does not explain informality. As a result, (1) the informal ones fear the audit, (2) the majority of the informal ones are not entrepreneurs, they are only poor without a job seeking to survive, (3) informality is a consequence of the lack of jobs,) Underdevelopment is the cause of informality.

PET (polyethylene terephtalate) is a type of plastic widely used in: beverage packaging, textiles, packaging, coils, tableware, mainly. According to Von Wedemeyer (2016) [11], in the year 2015 was exported 917,485 t of plastic raw material, of which 13% was PET which is equivalent to 122,015 t. At the national level 336,000 t/year of plastic of which 120,000 t corresponds to PET, that is to say on average 10,000

t/m of PET is generated. On the other hand, Peru produces 4 billion PET bottles.

Von Wedemeyer's research indicates that a tons of personal PET bottles of 600 ml represents a volume of 72 m³. In Peru it would be equivalent to 8,640,000 m³. More than 90% of the recycling of PET bottles in Peru is informal.

In Peru, there is a promotion of the recycling of plastic from the concept Bottle to Bottle, through D.S. $N^{\circ}b038$ -2014-SA: Modify regulation on health surveillance and control of food and beverages; which is born taking as an example successes and failures of countries in the region. The implementation of the process should involve a Public-Private Alliance (PPP), making the whole value chain responsible, setting targets for refuse and/or collection depending on the nature of the waste, generating a sustainable recycling industry; the objective is to generate a profitable and sustainable recycling industry, according to national needs and reality. However, in order to make the integrated waste management system sustainable, it should have considered aspects such as:

- Reduction of entry barriers to recyclers formality, formalization in national registry and social valorization; this will allow to empower, formalize and value recyclers, encouraging more work.
- Generate a Producer and Distributor Extended Responsibility Law (REPD) that obliges producers and distributors to organize and finance collection through reuse and/or collection goals depending on the nature of each waste; This will make it possible to hold each producer responsible for the waste he puts into circulation, and to the distributors he sells.

Recycling is part of the industrial value chain, input materials are extracted from the waste stream, rather than being extracted or harvested. They are (re) processed mechanically, thermally and chemically to meet industrial specifications, and sell to producers. The revenue model is trade in goods. In contrast to waste disposal, recycling is its core is not a public service.

Recycling markets are globalized, prices are set globally, they are published for metals and paper, they also rise and fall very quickly, so fortunes can be lost in a day. For this reason, buyers hate small amounts because transaction costs are relatively high, making the price per kilo greater when you have more to sell (reverse demand curve).

From a perspective of participation in recycling, Vera (2009) [12], seeks to determine the factors that motivate households to become involved, concluding that "... knowledge of the benefits of recycling, educational level, gender and household income Greater influence on the decision to recycle some solid waste material in the homes". He also points out that "... family size does not influence the decision to recycle, regarding the age of the person, indicates that when people are young they do not have much interest in participating in recycling because they have little exposure to the problem And this changes as age increases, as they are expected to gain a greater awareness of the benefits of recycling and the associated costs of not recycling". However, the author does not focus that the greater activation and movements for recycling are led by young people motivated by the search and need to build a better present, to believe that it is possible to have a future; Likewise, the research fails to point out that municipal awareness programs, motivated by the Municipal Incentive Program, are carried out by young people (many of them volunteers), because they find a means and an opportunity to contribute to the solution of a problem latent.

In the Peruvian system, decisions on household participation do not depend on economic incentives; to date, there is no structured market for recyclable materials, such as deposit-refund schemes, which is why the analysis of the econometric model proposed by Vera (2009) Is valid considering variables such as: 1) knowledge of the benefits of recycling, 2) level of education, and 3) household income have a greater influence on the recycling of some solid waste material in the household. That is, factors linked to the household economy, and above all, to education interact favorably in the level of household response; also analyzing the system as a whole, the educational variable is present transversely to professionalize the activity, incorporating processes of planning, design, investment in capital, equipment, operations and communication. Finally, he concludes that "While the family size variable has a negative response in recycling, which indicates that if the number of members of a family increases, the probability of participating in the recycling of some material decreases".

Biderman quoted (2017) [13], that the average market value of one tons of recyclable mixed material arriving at a state recovery facility fell from just over \$ 180.00 in early 2011 to less than \$ 80.00 by the end of 2015. This Value has rebounded slightly, according to Taylor, to just over \$ 100, but still leaves the industry struggling to extract profits from the millions of tons of recyclable material that Americans throw away each year.

There are a number of reasons for the decline in the recycling market, ranging from global trade policy to declining newspaper readers, according to Biderman (2017). Much of the recovered US waste is shipped abroad, but China has set new limits on imported waste by 2013. In other nations, "there has been a decline in demand for such material, as the growth rate in foreign countries has stabilized. Low oil prices have made it cheaper to produce new plastic bottles, so manufacturers do not have that much need for recovered plastic". In addition. packaging manufacturers have discovered how to make bottles and cans thinner, so they do not need a lot of raw material. Across the recycling industry, "what was once a valuable product five years ago now is less valuable".

From the perspective of environmental economics, Mora (2013) [14], states that: "To protect the environment, different methods have been proposed, one of the most common being tax incentives, however, we see environmental taxes that until recently were not applied In the region have come to life in Ecuador, becoming one of the pioneer countries to take this international trend. Therefore, these taxes must enjoy certain characteristics and be applied in conjunction with other methods of environmental protection in order to produce more efficient effects. In order to do this, it is necessary to take into account the principles of environmental law such as polluter pays, the principle of capacity to contribute will have a different position compared to what happens in traditional taxes, will also be based on the principle of solidarity and cannot forget that it can cause regressive effects. In addition, for its implementation it will be necessary to analyze if it is intended to make a real fiscal reform directed towards environmental protection where we would face a comprehensive reform or if on the other hand it is a partial reform in which environmental taxes play a secondary role. The latter is of vital importance since it will depend on how the collection of these taxes will be handled as we have shown during this work". Finally, he argues, "... to insert the idea of environmental taxes requires a strengthening of the competent institutional bodies to determine environmental and fiscal policies, in which it is possible to monitor and control how through different figures Taxation is being carried out with the aim of not encouraging polluting behavior, since the experience of several countries shows that in the gradual introduction of environmental taxes carry with them the joint application of several instruments of environmental protection, finally to decide which fiscal instruments Are the most effective".

Duran de La Fuente (1996) [15], also tries to give the approach that "The economic instrument of environmental management more adequate in relation to the disposition of the domestic solid waste corresponds to a system of tariff by unit, since besides fulfilling the criterion of efficiency, Supports the polluter-pays Principle, the principle of equity and encourages to reduce the amount of waste".

According to Oldenhage (2016) [16], "the polluter-pays principle seeks to charge generators of solid waste that introduce the products into the market. This principle is already used in Europe, mainly for waste producers such as packaging, tires, used oils, batteries and batteries, and electronic and electrical waste". In Peru, the national solid waste authority, the Ministry of the Environment, must apply this principle by acting as inspector, and forcing collectors, municipalities and consumers to participate: establishing goals, training, sensitizing and promoting the financing of projects through the municipalities; all this will allow the fulfillment of forced targets of refusal and/or collection for producers backed by a compromised value chain.

An alternative to organize the informal system, especially in the lower levels of the base of the recycling pyramid, comes from the approach of Chidiak & Beercovich (2004) [17], which indicate that to achieve an adequate management of urban solid waste, especially in the field Collection and recovery it is necessary the involvement of microenterprises or SMEs and the allocation of microcredit, this from local micro enterprises in the provision of urban environmental services (linked to cleaning and collection-recycling of waste) in Buenos Aires and In Rosario, and in cases where microcredit has contributed to strengthening the atomized supply of urban environmental services (through cardboard cooperatives). They conclude that "In relation to microcredit, it is important to emphasize that it seems to play a crucial role in achieving a better provision of urban environmental services, especially in peripheral areas, and in improving the working conditions of members of cooperatives. This refers not only to its obvious role in providing working capital and financing for the provision of equipment and premises, but also contributes to giving credibility to the ventures

against other evaluation bodies (in relation to other financing such sources of as associations. Establishment of cooperatives, etc.) and can provide a framework in which to provide technical assistance for the proper management of the initiatives". In this way, "The proper use of the social, environmental and economic benefits of these enterprises for the management of urban solid waste requires their formal recognition, that is, to prevent them from functioning in marginality (as they have done so far, so far). Public recognition and participation (at the municipal level) seems crucial, and in many cases even requires a change in the regulatory framework (for contracts and tenders related to the provision of urban environmental services). The greater recognition of such undertakings may face the opposition of large companies awarded contracts for hygiene concession and waste management or even confrontation with other competitors for the provision of such services (even within the informal circuit)".

5. Conclusions

There is an environmental valuation gap in the materials recycling in North Lima, mainly in plastic because the system of participation in recycling does not depend on economic incentives, causing a decrease in the market, because the polluter-pays principle is not applied, and informality in the development of the activity.

References

- Rodrigo Zevallos, Anomia in Peru, October 30, 2003, available online at: http://misociologia.blogspot.pe/ 2004/05/30-de-october-del-2003-rodrigo.html
- [2] Alberto Huiman Cruz, Implementation of new technologies in sanitary landfills for the effective management of by-products in the final disposal of solid waste in Peru, postgraduate thesis, National University of San Marcos, Lima, 2013.
- [3] Healthy City, *By the Recycling Route in Peru* (1st ed.), Lima: Graphic Range, 2010.
- [4] Tjalfe G. Poulsen, Waste Management & Research. Future Informal Waste Material Recycling:

Implementation of Return Fees? Vienna, ISWA, 2014, p. 47.

- [5] Lima Metropolitan Municipality, Comprehensive environmental management plan for solid waste in the city of Lima, Lima: MML, 2014.
- [6] Jesús Martínez Soria, Informal employment and segmentation of the urban labor market in Mexico, postgraduate thesis, Autonomous University of Barcelona, Mexico City, 2008.
- [7] Hernando De Soto, *The Other Path: The Economic Response to Terrorism*, Lima: El Comercio S.A., 1989.
- [8] Hernando De Soto, The Mystery of Capital: Why Capitalism Triumphs in the West and Fails in the Rest of the World? Lima: El Comercio S.A., 2000.
- [9] L. Alcázar and M. Jaramillo, The impact of the municipal license on the performance of microenterprises in the Cercado de Lima. Research Document no. 64, GRADE, Lima, 2012, available online at: http://www.grade.org.pe/publicaciones/1133-el-impactode-la-licenciamunicipal-en-el-desempeno-de-las-microem presas-en-el-cercado-de-lima/.
- [10] Rafael La Porta and Andrei Shleifer, Informality and development, *Journal of Economic Perspectives* 28 (2014) (3) 109-126.
- [11] Peruvian Industry, Informality that Incinerates Development by Von Wedemeyer Andreas, National Society of Industries, 2016, pp. 23-25.

- [12] Rossana Vera Alarcón, Economic, social and environmental effects of the formalization of municipal solid waste segregators in two districts of the province of Lima, postgraduate thesis, La Molina National Agrarian University. Lime, 2009.
- [13] David Biderman, Recycling is in trouble and it might be your fault, *USA Today*, 2017.
- [14] Adriana Mora Bernal, Environmental taxation: reflections on the law of environmental promotion and optimization of state income, postgraduate thesis, Simón Bolívar Andean University, Quito, 2013.
- [15] Hernán Duran de La Fuente, Analysis and proposals for the rates of domestic solid waste in Latin America. Economic Commission for Latin America and the Caribbean. Santiago de Chile. Economic Commission for Latin America and the Caribbean, 1998.
- [16] Frederike Oldenhage, Proposal for a management program to improve the solid waste management in the district of San Juan de Miraflores regarding the environment, the pick-up service and the behavior of the population, postgraduate thesis, National University of San Marcos, Lima, 2016.
- [17] Martina Chidiak and Néstor Bercovich, Microcréditos y gestión de servicios ambientales urbanos: casos de gestión de residuos sólidos en Argentina, Santiago de Chile, Naciones Unidas – Comisión Económica para América Latina y El Caribe, 2004.