

Waste Management and the Economic Value of Recycling in Households in the Santa Mónica - Chota Sector, 2023

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Abstract

Solid Waste Management and the economic value of recycling in households are two problem variables faced by the various organizations on the planet, the first ERVs to reduce its generation, storage and location, and transfer to those responsible for transporting it to final disposal sites; the second ERVs the reuse and separation into organic and inorganic SR to start the recycling process from households. The deductive problematization of the research sought to determine the relationship between the variables and their respective dimensions, after identifying the management of SRWM and ERV in the households in the study area. The work followed the quantitative approach of descriptive type, correlational design, worked with a stratified sample of 214 heads of households in the most popular neighborhoods of the Santa Monica - Chota sector, who responded to two questionnaires: the information obtained in both instruments indicates that the SWM and ERV is regular in the surveyed households; the correlation analysis of the results of the respective dimensions and the variables, according to Spearman's Rho Correlation coefficient, indicates that there is a weak positive relationship, since the values obtained range from 0.247 to 0.477 with bilateral significances of 0.001 to 0.034, data less than 0.05% error where ($p < 0.05$), results that accept the hypothesis proposed.

Key words: Management, solid waste, economic value and recycling.

I. INTRODUCTION

Solid Waste Management (SWM) and the Economic Value of Recycling (ERV) in households are two problem variables facing societies around the world. Giving an economic value to the recycling of solid waste generated in households requires quantifying the adequate use of goods and services used in the activities of each household. Studies developed by [1], state that the "take-make-dispose" economic model leads families to acquire various means and materials for domestic use that generate SR; in order to achieve Sustainable Development Goal (SDG) 11, it encourages citizens to live in sustainable cities and communities;

Goal 12 demands to produce and consume resources responsibly, both articulated to the other 15 SDGs of the UN 2030 agenda, warn that recycling is an activity that allows to generate income from the implementation of the circular economy, in each household the SWM starts and is responsible for the sustainable use of the resources they consume. The ERV, is demonstrated by using processes that guide the classified collection of Solid Waste (SW), implementing policies, standards and actions that prevent the environmental problem from households.

The problem is fully manifested in Latin America, given that SWM is linked to ERV, policies that should be implemented and promoted from each household, tons of waste is generated daily, materials that for lack of environmental policies, educational programs that induce the population to practice recycling from their homes, guiding them to give a plus to their income, are not yet implemented. The [2], states that in the continent only 4% of the waste generated in the cities is recycled, while in the countries affiliated to the OECD, 20% is recycled; it is estimated that cities in developed countries separate recyclable materials between 15% and 20%, while between 80% and 85% do not. The data show the poor environmental management that is being practiced by those responsible for leading the cities, there is no implementation of recyclable policies that induce households to manage the sorted collection of SW, reuse is promoted, not only giving an economic value, but managing spaces and healthy environments through the practice of the circular economy.

In Peru, within the various cities of the regions, increasing amounts of waste are being concentrated, the cause would be in the inefficiency of those responsible for municipal administration, since they are not clear about the implementation of policies that promote ERV through SWM. In a study by [3], carried out at the Provincial Municipality of Tambopata, Madre de Dios region, which has a population of approximately 74,494 people, where population growth is 2. The study indicates that the authorities are overlooking the implementation of the 4SW "reduce, recycle, reuse and recoERV", only a small socioeconomically poor population can be observed that is dedicated to collecting plastic bottles, paper or metal scraps, considered as a source of work, because it generates little income to support part of the basic needs of the family. In that line [4], highlights that in the country only 1.9% of reusable waste generated by the population is

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recycled, the small percentage shows that the economic value is not given to recycling, despite being a global policy that favors environmental conservation, the economic value to recycling, would favor the saving of inputs that are extracted from nature, both for human consumption and for industry; promoting the implementation of the SWM and the ERV from homes, would facilitate the development of an environmental culture framed in sustainable development.

The problem is transferred to the region of Cajamarca, where the ERV is unnoticed, the fact is evident in the collection of MSW in the cities, which after being transported to supposed dumps are buried, where decomposition not only contaminates the soil or water with leachates, but also leads to environmental contamination. In his research [5], found that in the 13 provinces of Cajamarca, the practice of recycling has not yet been implemented, therefore solid waste management is helpless, they state that the implementation of Law 27314 is not being fulfilled, because 92% of municipalities do not have technological equipment, 100% have not been allocated resources for the implementation of the "Integral Environmental Management Plan", 92% do not have the mechanism to charge for the cleaning service in the cities and 100% do not implement the "Environmental Management Unit"; There are only two sanitary landfills in the region. The information shows that the implementation of the ERV and environmental management are deficient, since the authorities do little or nothing to promote SWM.

In the province of Chota, the problem is alarming; the 19 districts do not have policies that promote SWM and ERV despite the fact that Law 27314 establishes the mechanisms that municipalities must implement "comprehensive plans for environmental management of SR" in their respective cities. In his study [6], found that the Municipality of Chota does not implement SRM policies, it is limited to collecting the waste generated in homes and then take it to a landfill of ditches or trenches, where there are hardly minimum sanitary conditions, the study states that each inhabitant generates about 0. The study states that each inhabitant generates about 0.177 kg of RS per day, while outside the homes an approximate of 38.85 kg per day would be generated, the data highlights that the accumulated density of RS in homes would be 114.38 kg/m³ and outside the homes would be generated up to 308.55 kg/m³. The information made it possible to argue that each household generates waste, which could be reused or selected for sale to recycling companies, generating economic value to recycling through the SWM. The research sought to obtain information on the ERV and the SWM in the households of the Santa Monica - Chota sector, 2023, the purpose was to determine the relationship of the variables, prior identification of the information at a certain time, to then establish their relationship and from the results an improvement plan is proposed that allows to enhance the SWM and the ERV in the households of the Santa Monica – Chota sector 2023?

The theoretical justification of the research was expressed in the procedures, values and knowledge of the SWM and the economic value in the households of each of the participating

families, facts that led to obtain information that synthesizes the activities inherent to the development of the variables, determining their usefulness and how they are interrelated, given that they are activities that contribute to the economic income of households and environmental protection.

In the methodological field, the justification is framed in the use of methodological processes, conducive to the search for information that give consistency to the drafting protocol of the work, helped in the development of data collection instruments, which after validation and reliability process, was applied to the study sample, where the tabulated responses were processed according to the established objectives and demonstrating the reality in which each variable studied is manifested.

In practice, the research presents the results that allowed the analysis and interpretation of the reality of SWM and ERV in households; variables that, if put into practice as a habit in households, would not only allow the maintenance of clean and healthy environments, but would also generate additional economic income that could alleviate the basic needs of the population.

In the social field, the interaction between the researcher, the families and the authorities of the institutions helped to investigate the SWM and ERV practiced in the homes visited, the information contributed to ERVify the active participation of the citizens, who are responsible for managing the collection of SW from their homes, establishing neighborhood policies that lead to the development of clean habits and promote the development of the circular economy.

The work was based on the general objective: to determine the relationship between SWM and ERV in households in the Santa Monica - Chota sector, 2023; aided by the specific objectives: to identify the management of SWM, identify ERV, establish the relationship between the dimensions of SWM and the dimensions of ERV and propose an improvement plan to strengthen SWM and ERV in households in the Santa Monica - Chota sector, 2023. The hypothesis was: There is a positive relationship between SWM and ERV in households in the study area.

At the international level, the publications of [7], developed with the objective of explaining the management of SW produced in the homes of commercial and industrial cities in Latin America, stand out as background, followed the qualitative analysis of digital academic sources of: Scielo, Google Scholar, Dialnet, uniERVsity repositories, Redalyc, etc., they used twenty-two journals extracted from five repositories; they found that SWM contributes to the sustainability and defense of the environment, the policies of burning or burying MSW, using open dumps, or throwing it into streams, rivers, lakes and seas in many countries, led Ecuador to establish public interest policies, promoting the recovery of spaces contaminated with waste; Argentina promotes SWM from homes, Chile develops integral policies, Colombia implemented the Logistics Law to attend to cleaning services, Mexico regulates "integral waste management" and

in Bolivia between 51% and 94% collect SR, with recycling reducing toxicity and non-biological raw material is 30% of the total. It was concluded that there are differences between emerging and developed countries, the cities have Integrated Systems (SWU), there are cities that are implementing Transport Systems with SWU, and improving the relationship between authorities and policies of SWM and ERV. The study contributed to have knowledge of the work according to the variables, highlights the results achieved in the analysis of the information according to the research objectives.

The researchers [8], in their report on financial sustainability of SWM in Latin America and the Caribbean, developed with the aim of ERVifying compliance with the (SDGs), from the implementation of SW treatment, found that about sixty-five million citizens do not have the service of SWM, has the lowest percentage rate of just 4% compared to other continents, 40% of waste is reported to inadequate places. The results induce to oERVcome the gaps in attention to the collection of SW, allocating funding to promote the classified collection from households, transfer and transfer to treatment plants, recycling and other utility; meeting the demand of SDG 11: "By 2030, the negative environmental impact per capita of cities should be reduced", implies urgent attention to avoid polluting the environment by the decomposition of waste. The information contributed to obtaining knowledge of the variable ERV, when talking about financial sustainability, there is a relationship with the study, in practice from households.

For its part [9], in their scientific article: Advances of circular economy strategies: comparative analysis from the realities of Buenaventura and Barranquilla, worked with the objective of determining the sustainable use of waste generated by factories operating in the cities mentioned, followed the qualitative approach, used as instruments of data collection observation, interview and field log according to three categories "communities under study, circular economy and SR"; the results indicate that in the fiSWt category, the communities investigated (Miramar - Buenaventura neighborhood) do not practice SWM, nor do they have disposal sites, thus becoming polluting focal points; The second category ERVifies that both Bajamar and Buenaventura are unaware of the circular economy, the recoERVy and management of SW, and do not have a perception of generating a business from the ERV; the third category finds that the management of SW is a problem for the communities investigated and that the plans of Integrated Management of SW go unnoticed, except in the town of Buenaventura that has a treatment plant and that the ERV, little by little, increases. They concluded that, in order to give economic value to recycling, the SWM should be implemented through a program that ERVks from households the practice of sorted collection of SW, to then transport it to final disposal sites and give it the added value that generates income. The study provides knowledge in practice of the circular economy, translating the ERV in the "redesign, reuse, renewal, recoERVy and recycling" of SW.

The scientific article of [10], Socioeconomic determinants of recycling in La Paz, Bolivia: a public policy analysis, worked with the objective of analyzing the determining factoSW in the probability of recycling, applied a household survey in order to identify the socioeconomic variables that have probabilities of recycling through a probit model; he evaluated the effect of the implementation of green points in the city of La Paz and the collection of recycling materials, in order to ERVify the environmental policy implemented; the results indicate that of the 3254 households, 35.7%. The results show that out of 3254 households, 35.7% carry out differentiated actions in the collection of SW promoted by the mayor's office. It concluded that: the variables identified as participation in plantation programs have no effect on the possibility of recycling, the concern for defending the environment is due to lack of awareness, there is no commitment to recycling, recycling goes unnoticed. The information consolidates the vision of the variable ERV, undeSWtanding that, from the analysis of the socioeconomic determinants, it is established that there are no induction programs to guide citizens in the development of recycling from each household.

The scientific article [11], developed with the objective of determining the cost-effectiveness of developing the public cleanup program, implementing the SWM in the municipality of Metepec, worked under five phases: the fiSWt identifying and establishing outreach to stakeholdeSW, the second evaluating the changes, the third measuring income ERVsus recycling, the fourth evaluating the social impact, and the fifth ERVifying the social rate of return on investment; the data indicated that the social return was 1.27, advocating that the public cleanup program had a positive effect on the social return. The study concluded that there is social, environmental and financial sustainability by implementing a public cleaning program in municipalities. The research served to explain the social return on investment in the SWM, variables analogous to the ERV, and which must be progressively implemented in order to contribute to the SDGs.

In the national background are the investigations of de [12], who in their scientific article: The importance of environmental management and SW management, developed with the objective of analyzing various concepts based on SW according to evolutionary effects of Scopus, Scielo, Redalyc and other articles published between the yeaSW 2018 - 2021, the analysis of the 51 articles shows that the main problem that environmental management is generated in the SW produced in urban areas, they highlight Brazil, Ecuador and Peru as the Latin American countries with the highest production, its accumulation is polluting soils, riERVs and seas. The study concludes that the large amount of waste is generated in homes in cities with the highest population and commercial activity, regretting that they have a low value for recycling and collection from homes. The research helped to assess the importance of the implementation of SWM from various areas of public administration in households, as it is an activity of ERV.

The their scientific article of [13], referring to the: SWM and its relationship with environmental education for sustainable development and strengthening of environmental culture, developed with the objective of "finding coincidences and diERVgences of the latest studies on SWM and its relationship with education and environmental culture", study of analysis of theses, articles, etc., used heuristic matrices and academic search engines; they consolidated information on SWM from education and public administration, the results reveal that STM and ERV, are not worked in municipalities and neighborhoods; they concluded that SWM, including sustainability and induction and environmental education programs strengthened ERV within environmental sustainability. The article gives validity to environmental education in the SWM, since the implementation of SR programs from households, gives economic value to recycling and reuse according to the type of raw material.

The scientific article of [14], entitled: Flow, classification and recycling potential of urban MSW in a locality whose main activity is agriculture, developed with the objective of analyzing the variables of recycling in 253 people dedicated to agriculture, the answeSW indicate that less than half classify waste according to recycling, the market promotes the so-called organic fraction by housing 52.2% of waste used to transform it into fertilizeSW, they find that recycling facilitates the use of waste to obtain other products or to use it for other purposes. The study concludes that working on the sorted collection of MSW from households requires the development of MSW programs, showing that 40% collect waste in a sorted manner, 3.46 tons are accumulated daily, 20.23% are distributed or thrown in agricultural areas and homes, while 79.76% are disposed of in sanitary landfills, 17 to 25 types of waste were identified and are feasible to recycle. The study strengthened the knowledge of the potential, flow and classification of waste, preventing it from being dumped in agricultural areas or places close to homes, the action demanded to undertake the development of a sustainable culture.

The scientific article of [15], entitled: Program to improve the level of citizen awareness on the collection of MSW in the neighborhood of San Carlos, Huancayo; aimed to raise awareness among citizens about the collection of MSW at its origin or generation, in order to revalue its usefulness in generating income through the development of training and publicity related to the classified collection of waste. The research helped the participants to practice waste collection habits from their homes, favoring recycling, deliERVy to the means of transportation to be taken to the sanitary landfill; they concluded that the development of the exposed program contributed to the formation and awareness of citizens, induced to use adequate collectoSW, where the SW are deposited in a classified manner, facilitating their recycling, favoring a clean and healthy environment. The research helped to ERVify the benefits achieved with the implementation of a citizen awareness program for the SWM and, at the same time, to discuss the results of the research.

The scientific article of [16], entitled: SWM of the city of Juliaca - Puno - Peru, worked with the objective of "characterizing the factoSW and conditions of SR, evaluating the possibility of reuse and determining costs and income generated by the activity". The analysis of information from a questionnaire applied to 167 heads of households in six areas with the largest population, highlighted the socioeconomic characteristic as the main characteristic, given that most of the families surveyed are engaged in commerce, followed by motorcycle taxi driERVs and workeSW in companies and businesses, the activity generates about 75,000 tons of waste per year; the answeSW indicated that 72% of organic waste was used in recycling, compared to 28% who denied it. They concluded that the recycling of organic MSW favored the production of compost, which contributed to benefiting citizens and improving municipal revenues. The study provided information from the SWM, facts analogous to the research variable and as far as reuse is concerned, which is related to ERV.

At the regional level, the study by [5], who in the scientific article: SWM of the Provincial Municipalities of the Cajamarca Region, worked with the objective of determining the efficiency of the SWM taking into account the approaches of Law No. 27314, followed the quantitative approach, non-experimental, had as a sample the 13 provinces that make up the region; The results indicated that there are critical causes that prevent the implementation of SWM programs, 92% do not have technical, technological and environmental advice, specialized labor or 100% respond that resources are not allocated to promote recycling from households, 92% indicate that there are no procedures for charging for public cleaning services, for 100% there is no environmental management unit, the region has two sanitary landfills. The results concluded that in the municipalities of the Cajamarca region, the SWM is deficient, as the policies established in Law No. 27314 are not implemented. The contribution of the antecedent allows us to have a clear undeSWtanding of the SWM that the municipalities of the region are developing and how they help to give an economic value to recycling from households.

The study is based on the conceptualization of the variables, starting from the definition of SWM, defined as the action of planning the development of a set of activities in order to collect in a classified manner from the place where they are generated and promote their recycling. In this regard [17], state that SWM is aimed at elaborating a management plan, which implies establishing processes to develop and implement within a public or private institution the reduction of waste generation, as well as promoting recycling from households. The fact demands political will from the authorities to undertake recycling actions from households or families, inducing that the culture starts at home, the household has to act to obtain economic benefits.

SWM involves promoting the sorted collection of waste in institutions, commercial places, homes, public spaces, tourist areas and any place where people carry out their activities. In his study [18], state that in the face of the SWM problem, the

one hundred and ninety-three countries that make up the United Nations (UN) from the 2030 Agenda, established among one of the objectives "to ensure the availability and sustainable management of water and sanitation for all" (p. 10). The action demands immediate attention to the SRWM, to encourage its proper collection, promote recycling and reuse in a safe way, without compromising the environment, making it an income generator, product of sustainable activity.

The dimensions of SWM are based on the contributions of [19], who emphasize that the dimensions of SWM are "generation, storage, collection, transport and final disposal" (p. 329). The described implies that SWM starts in households, shopping centers, company premises or various spaces that society uses it for different purposes. The research of [20], specifies that the number of studies published in the Scopus journal network: Brazil establishes "generation and conventional collection" as dimensions, in Mexico "selective and conventional collection, valuation and final disposal", and the Inter-American Development Bank establishes that Latin American countries should adopt "generation, selective and conventional collection, valuation and final disposal" as dimensions (p. 459). Since the research was conducted with household management, no specific dimensions were found, which led to assume as SWM dimensions "the generation, storage and transfer of SR" from households.

The generation of SR is the dimension that comes from human activities, from the acquisition, preparation, consumption of food, productive sequences of inputs and finished goods. In his paper [21], point out that the SWM is initiated by the peSWon, who must select and place it according to the type of biodigester from the home or common good spaces. It is the act of reducing the generation of SR in the home as a result of the acquisition of food products, work or family activities, whose waste is placed in a container. The study by [22], state that SWM in households is of concern in any area of the planet, actions should be taken to promote its reduction from households through induction programs promoted by public institutions. The study ERVified that the activities practiced in households serve to reduce SWM in families.

The storage and location of MSW is the phase of separating and placing usable and non-usable MSW in specifically selected collection points to prevent health risks, pollution, risks or damage to people and the environment. The work of [23], establish that the storage or deposit of SW generated by human beings is the fiSWt phase of SWM, given that eERVy peSWon is the main generator and the one who must place it in suitable digesteSW to facilitate its reuse. The process shows that those responsible for leading public and private institutions should encourage the population to put into practice the proper storage phase of MSW, as this is the beginning of good management and promotion of recycling.

The transfer of MSW is the activity undertaken by the people responsible for each household; it consists of deliERVing MSW to those who perform the public service in

collection trucks, the function is to deliERV the waste generated to be taken to the place where the final disposal is carried out. In his work [24], indicate that it is the activity that regularizes public cleaning using collection trucks, it is a common activity promoted by the municipalities of Latin American countries, it is used to transport waste to treatment plants or final disposal. It is characterized by the collection of waste accumulated in different spaces, to be taken to sanitary landfills or treatment plants.

The transfer of MSW from households to waste collectors is the last phase; the collection carts are in charge of transporting it to the final disposal; organic MS are used for composting and inorganic MS are used for recycling according to their variety or to promote their degradation. In their paper [25], they mention that the final disposal of solid waste is an activity that reduces the threat of contamination and that the development of the previous phases should be encouraged in the different areas where human activities are carried out, in order to reduce contamination.

The ERV, is defined as the work that leads the peSWon to reduce the production of waste through the practice of recycling, it is the work that allows collecting, transforming and manufacturing new products from the use of recyclable material; it responds to the activities that people develop in order to take advantage of organic and inorganic matter generated from the consumption of goods and services [26]. Giving ERV, leads to follow processes of transformation of the collected waste, or to collect it in a sorted way, promoting its sale to generate income.

The ERV, induces the implementation of policies that generate awareness, leads the population to adopt mechanisms and practices for waste collection, classifying it according to type of waste. In its analysis [27], indicate that ERV goes hand in hand with the circular economy, it is a characteristic of the industry that uses recyclable raw materials, its mission is to "extract, produce, use and throw away" following the paradigm of sustainable production and consumption. He specifies that the ERV, is an activity that demands immediate attention to revalue productivity and utility in the production of goods and services.

The dimensions of the ERV are the decomposition of the variable into its parts, i.e., those factoSW, features or characteristics that allow the elaboration of indicatoSW and items in order to obtain the information required by the objectives. The work of [28], establishes that household waste management should have a ERV; to achieve this, it is necessary to develop collection works, operations for the separation of organic and inorganic waste, as well as strategic actions that promote reuse. The dimensions land on the indicatoSW of segregation, recoERVy and valorization, to give an economic value to recycling.

In the research contributions of [29], the dimensions of the VER translate into its objectives, benefits, classification, types, guidelines and time for the recycling of SW, entails establishing quantitative data collection indicators, with

proposal of open questions according to information needed for the study of the variable. The dimensions of recycling management in relation to SEE are used to establish the indicators in relation to the items. The dimensions of the variable "VER" are: reuse of RS, separation of organic RS and separation of inorganic SW.

The reuse of MS in the home is the process of collecting waste produced in the home as a result of food preparation, daily activities or the acquisition of goods and services to meet various human needs. The research of [22], states that various types of waste are generated in the home, they can be hazardous and non-hazardous, it is a product of the activities carried out in the homes, its recycling will allow to treat it according to the type of waste generated. The collection of MSW from households facilitates recycling by classifying it according to its usefulness.

The separation of organic MSW in the home is the action of classifying MSW according to the economic value of the waste from food of natural origin to be used for various purposes. The investigation of [30], indicates that organic SR are materials that are produced daily from the activities carried out and that are discarded when they are considered no longer useful. The meaning of recycling is found in the classification of organic SR to give it ERV, it can be used to produce animal feed or sold for the practice of composting, favoring the production of organic fertilizeSW.

The separation of inorganic MSW is the action that consists of identifying non-biodegradable waste, including the remains of metals, plastics, leather, ceramics, fibeSW, clothing, wood, etc., which should have a utility through recycling. The work of [31], indicates that all the waste generated by man in his home has economic value, given that in the final disposal they ERV their utility and generation of profit; not giving economic value to immense quantities of textiles, paper, glass, wood, etc., would be lost and the planet would be polluted. The dimension made it possible to obtain information on the utilitarian practice of SW in households.

The research is supported by the theory of ERV, which is expressed in the circular economy, is aimed at caring for the environment and making immediate changes in the production of goods and services consumed daily. For their part [32], point out that the circular economy is a proposal that seeks to bring consumers closer to the practice of recycling, it must be apprehended and perceived in each person, motivating them to think and execute the responsible use of the various products. The fact induces the heads of households, to acquire products that generate less waste, are recycled and promote the consumption of environmentally friendly products.

The circular economy, through the practice of recycling, ERVks to extend the life cycle of the products used, to change the vision, to stop devaluing them as waste, and to promote their reuse and contribution to economic income. In its approaches [32], describe that the circular economy starts with the user, who has the responsibility to collect the garbage to give it utility and reincorporate it into the productive process,

the ERV resides in the generation of income. The circular economy has an initiative in the raw material deficit, it values waste by maximizing its reuse in an effort to promote sustainability.

METHODOLOGY

The work is of a quantitative approach, descriptive type, it sought to characterize the fundamental aspects of the variables, followed the cross-sectional type, obtaining data at a certain time [33]. It followed the logical consistency of the formulation of the problem, objectives and contrast of the hypothesis, used the non-experimental - correlational design, since, from the collection and analysis of the information, it established the relationship between the variables and their respective dimensions [34].

The population was represented by a conglomeration of subjects where the research was carried out, it served to collect the information that demanded the variables according to the objectives set out by [35]. It was finite, composed of 483 people, each one representing a household located in the Santa Monica sector of the city of Chota.

He sample was a subset drawn from the population, its selection was probabilistic [36]. It was made up of 214 people representing the households selected from the Santa Monica - Chota sector.

For the sampling of the households, the proposal of [32], was followed, so that all household heads had the same opportunity to be part of the sample. Participants were selected using [37] sampling proportion formula, $fh=n/N$.

The technique used in data collection was the survey, a tool that establishes the items of the questionnaire [33]. The questionnaire was used as an instrument, with a Likert-type scale [34]. The validity was carried out by three experts, a PhD in Public Management and Governance with collegiate No. 12-262 and two CONCYTEC RENACYT researchers accredited with registration P0052626, Level-II and P0077535, Level-V. The analysis of the Cronbach's Alpha coefficient of the SPSS 27 statistical software, reported that each questionnaire has acceptable reliability, the ranges are greater than 0.8, a value that gives good internal consistency [38].

Data processing and analysis used descriptive statistics for the first two objectives and inferential statistics for hypothesis testing, which allowed analysis of the normal distribution test, allowing the use of Spearman's Rho test. The interpretation of the correlation coefficient used the values of (0) null correlation, (± 0.01 to ± 0.10) very low correlation, (± 0.11 to 0.50) weak correlation, (± 0.51 to ± 0.75) medium correlation, (± 0.76 to ± 0.90) considerable correlation, (± 0.91 to ± 0.99) very strong correlation, and (1.00) perfect correlation [39].

RESULTS

Table 1

Solid Waste Management in households in the Santa Monica - Chota sector, 2023

Manage	Generation of Solid Waste		Selection and placement of solid waste		Solid Waste Transfer.		Solid Waste Management	
	fi	%	fi	%	fi	%	fi	%
Deficient	12	5.61	51	23.83	66	30.84	19	8.88
Regular	113	52.80	107	50.00	84	39.25	125	58.41
Good	73	34.11	50	23.36	60	28.04	65	30.37
Excellent	16	7.48	6	2.80	4	1.87	5	2.34
Total	214	100.00	214	100.00	214	100.00	214	100.00

Note: Information obtained from the database of the questionnaire applied to the sample.

The information in Table 1 and Figure 1, indicate that the majority of households in the three dimensions and variable is regular, allows reflection on the difficulties presented, induces public institutions to implement the work demanded by the three dimensions of SWM from households, to assume responsibility for reducing their generation, storage and location, and transfer.

Table 2

Economic value of recycling in households in the Santa Monica - Chota sector, 2023

Value	Reuse of solid waste in the home		Separation of organic solid wastes		Separation of Inorganic Solid Waste		Economic value of recycling	
	fi	%	fi	%	fi	%	fi	%
Deficient	25	11.68	65	30.37	57	26.64	20	9.35
Regular	97	45.33	109	50.93	113	52.80	142	66.36
Good	72	33.64	33	15.42	36	16.82	46	21.50
Excellent	20	9.35	7	3.27	8	3.74	6	2.80
Total	214	100.00	214	100.00	214	100.00	214	100.00

Note: Information obtained from the database of the questionnaire applied to the sample.

The information in Table 2 and Figure 2 indicate that the majority of households in the three dimensions reuse and classify organic and inorganic MS at home on a regular basis; this fact leads to strengthening the practice of the dimensions and variable, since recycling activities generate economic income for families. It is necessary to propose actions that induce institutions to promote the reuse of MS, transferring it for recycling or adding value at home.

Table 3

Kolmogorov - Smirnov normality test

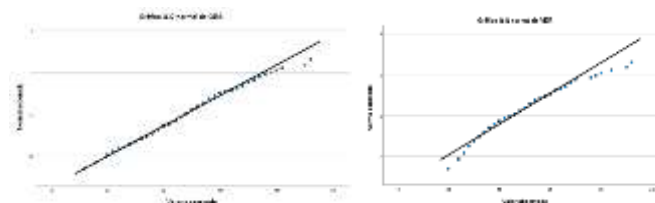
Variables	Statistic	gl	Significance
Solid waste management	,072	214	,01
Economic value of recycling	,085	214	,01

Note: Information obtained from the database of the questionnaire applied to the sample.

The distribution analysis of the data using the Kolmogorov-Smirnov normality test, since the sample is greater than 50, indicated that the significance values are less than 0.05 ($p < 0.05$), indicating that it has a normal distribution; therefore, the testing of the hypothesis according to objectives was analyzed with Spearman's Rho Coefficient, as shown in the figure below.

Figure 1

Kolmogorov - Smirnov normality plot



Note: Information obtained from the database of the questionnaire applied to the sample.

The figure expresses the deviations of the points around the line, indicating that the distribution of the results obtained from the sample is normal, with the origin at the 0.01 point.

Table 4

Relationship between the dimensions of solid waste management and the dimensions of the economic value of recycling in households in the Santa Monica - Chota sector, 2023.

Dimensions and variable: SWM	Rho de Spearman	Variable dimensions: ERV			
		Reuse of solid waste in the home	Separation of organic solid wastes	Separation of Inorganic Solid Waste	Economic value of recycling
Generation of Solid Waste	Coef. of corr. Sig. (bilateral)	,336**	,272**	,201**	
Selection and placement of solid waste	Coef. of corr. Sig. (bilateral)	,247**	,267**	,145*	
Solid Waste Transfer	Coef. of corr. Sig. (bilateral)	,413**	,408**	,318**	
Solid Waste Management	Correlation coefficient Sig. (bilateral)				,477**

** . The correlation is significant at the 0.01 level (bilateral).

* . Correlation is significant at the 0.05 level (bilateral).

Note: Data obtained from the questionnaires applied to the sample of households in the Santa Monica - Chota sector, 2023.

The information presented in Table 4 shows that the analysis of the results according to the SW generation dimension with the dimensions SW reuse, organic SW separation and inorganic SW separation has a weak positive relationship of 0.336**, 0.272** and 0.201**, the relationship between the SW storage and location dimension with the dimensions SW reuse, organic SW separation and inorganic SW separation, has a weak positive relationship of 0.247**, 0.267** and 0.145*, the relationship between the dimension SW transfer with the dimensions SW reuse, organic SW

separation and inorganic SW separation, has weak positive relationship of 0.413**, 0.408** and 0.318*, as well as the relationship of the variables of 0.477** with bilateral significances of 0.001 and 0.034 in only one case, are values less than the margin of error of 5% (p<0.05). The information accepts the hypothesis; therefore, there is a weak positive relationship between the SWM and the ERV in households in the Santa Monica - Chota sector, 2023.

Table 5

Proposal for an improvement plan to strengthen SWM and ERV in households in the Santa Monica - Chota sector, 2023.

Variable	Dimension indicatoSW	Problem	Possible causes	Proposal
SWM en hogares	Solid waste production	Increase in solid waste production	Lack of interest in reducing solid waste production	Purchase products that do not generate solid waste.
	Solid waste sorting capacity	Depositing mixed solid waste in one container.	Indifference to solid waste classification	Sorted collection of household solid waste in colored bags.
	Collection and handling of sorted waste.	Collection and handling of mixed solid waste.	Inattention to the collection and handling of sorted solid wastes.	Delivering of solid waste produced in the household in a sorted manner.
ERV en los hogares	Use of solid waste in the home	Excessive consumption of products that generate solid waste.	Waste of solid waste in the home.	Reuse of solid waste produced in the home.
	Economic value of organic solid waste.	No economic value is given to the organic solid waste produced in the household.	Neglect of the economic value of solid organic waste in the household.	Recycling organic solid waste produced in the home.
	Economic value of inorganic Solid Waste.	The economic value of inorganic solid waste produced in the household is not given.	Neglect of the economic value of inorganic solid waste in the home.	Recycling inorganic solid waste produced in the home.

Continuation of the table

Objetive	Target	Measure	Control	Responsible
Orienting household manageSW to consume products that do not generate solid wastes.	20% reduction in solid waste production	Number of households that reduce the production of solid waste.	Diary	Administration of the Municipality
Promote the sorted collection of household solid waste in colored bags.	20% of households sort solid waste in colored bags.	Number of households that collect solid waste in a sorted manner.	Diary	Administration of the Municipality
Promote the deliERVy of Solid Waste produced in the home in a sorted manner	20% of households hand in sorted solid waste	Number of households that deliERV solid waste in sorted form.	Diary	Administration of the Municipality
Encourage the reuse of solid waste produced in the home.	20% of households reuse sorted solid waste in the home	Number of households that reuse Solid Waste produced in the home.	Diary	Administration of the Municipality

Promote the recycling of organic solid waste produced in the home.	20% of households recycle organic solid waste produced in the household.	Number of households that recycle the organic solid waste produced in the household.	Diary	Administration of the Municipality
Promote the recycling of inorganic solid waste produced in the home.	20% of households recycle inorganic Solid Waste produced at home.	Number of households that recycle inorganic Solid Waste produced in the home.	Diary	Administration of the Municipality

Note. Information obtained based on the results obtained from the application of the questionnaires to the sample.

DISCUSSION

The statistical data in Table 1 and Figure 1 indicate that the majority of household representatives regularly reduce the generation, storage and disposal, and transfer of MSW, i.e., only sometimes. The information contradicts the research of [7], finding that in Bolivia between 51% and 94% collect their waste, reduce toxicity with recycling and that the non-biological raw material is 30%. It contrasts with the study by [12], when they state that the main problem of environmental management is SWM in urban areas of Brazil, Ecuador and Peru, since these are Latin American countries with the highest production of SR. It contributes to the research of [9], who demonstrated that the management of SR is a problem for the communities investigated and that Integrated SR Management plans go unnoticed. It strengthens the work of [13], who by analyzing theses, articles, etc., conclude that holistic promotion applied in SWM, including sustainability and induction and environmental education programs, strengthens the ERV, conclude that the holistic promotion applied in the SWM, including sustainability and environmental education programs and strengthens the ERV. Contributes to the study of [14], to point out that less than half of the population classified waste according to the recycling, houses the 52.2% waste and serve to transform it into fertilizer, find that the harnessing of waste serves to get other products or use it in other purposes. They strengthen the work of [15], by detailing that few people practice habits of collection of sorted MSW from their homes, encourage recycling and deliERV it to the means of transport to be taken to the landfill.

On the SWM management variable, in general, according to the scale of the instrument's data sheet, the majority responded that they regularly manage the activities that can be inferred from the variable. The results contribute to the study by [8], by specifying that about sixty-five million citizens do not have the waste management service, the rate is 4% compared to other continents, 40% of waste goes to inadequate places, there are differences between the challenges of emerging and developed countries, in having integrated systems (MSW). It strengthens the study of [5], by demonstrating that there are critical causes that prevent the implementation of SWM programs, 100% respond that resources are not allocated to promote recycling from households and 92% point out that there are no procedures for the collection of public cleaning services.

The information in Table 2 and Figure 2 indicate that the dimensions reuse and organic and inorganic MSW in households are performed regularly, i.e., that only sometimes recycling takes place. The information contradicts [16], showing that the SWM is an activity that generates about 75,000 tons of waste per year and that 72% of are taken advantage of in recycling, compared to 28% that they denied. There is a relationship with the publication of Osorio (2020) [10], by pointing out that only 35.7% perform differentiated actions in the collection of SRW. They concluded that the socioeconomic determinants of recycling have no effect on the possibility of recycling. It contributes to the research of [11], highlighting that the SWM is conducive to recycling, concluding that the social return was 1.27, shows that public cleaning has positive financial effect on families that recycle inorganic SW.

The variable ERV, in general, highlights that it is manifested in a regular manner. The information validates the study by [9], by demonstrating that the communities investigated do not put SWM into practice, nor do they have disposal sites, thus becoming polluting focal points; as for the second category, it is ERVified that they have no knowledge of circular economy, they do not know how to manage MSW, there is no perception of generating a business from the SRW, they do not know how to manage the waste, and there is no perception of generating a business from the ERV.

The information in Table 4 shows that the correlation analysis of the results of each dimension of the SWM variable and the dimensions of the ERV variable indicates that there is a weak positive relationship ranging from 0.145* to 0.413**, with bilateral significance ranging from 0.001 to 0.034, values less than 5% ($p < 0.05$) of error; the statistical data indicate that the hypothesis is accepted. The results are close to the study of [15], who found that the citizens who participated in the research have positive attitudes about the collection of SR at its origin or generation, revaluing its usefulness. It strengthens the study of [16], who when analyzing the information obtained a positive relationship. It contributes to the research of [19], who find that SWM is related to recycling, an activity that provides ERV.

The statistical analysis in Table 4 shows that the relationship between the SWM and ERV variables is a weak positive relationship of 0.477** with a bilateral significance of 0.001, less than 5% ($p < 0.05$) of error, a value that validates the hypothesis proposed. The result contributes to the study of [17], who state that SWM is positively related to ERV, which implies implementing action plans within public or private institutions to promote the reduction of waste generation and recycling from households. It strengthens the study of [27], indicating that SWM and ERV are significantly related and go hand in hand with the circular economy; it is a characteristic of the industry that uses recyclable raw materials.

Taking into account that the results show that there is a weak positive relationship, the proposal for an improvement plan to enhance the SWM and the ERV in households is born,

taking into account the statistical values of [13], specified in their scientific article, highlighting that the holistic promotion applied in the SWM, including sustainability and induction programs and environmental education increases positively with the ERV, putting into practice environmental sustainability. Likewise, the proposal would take as a foundation the contributions of [32], who point out that the circular economy is a proposal that ERVks to bring consumeSW closer to the practice of recycling, must be apprehended and perceived in each peSWon, motivating them to think and execute a responsible use of the various products, to impact on the economic generation that can give the practice of recycling.

CONCLUSIONS

It was determined that the relationship between the SWM and the ERV in households in the Santa Monica - Chota sector, 2023 is a weak positive relationship of 0.477**; with a bilateral significance of 0.001 less than 5% ($p < 0.05$) error. The information shows that the hypothesis is accepted; therefore, there is a weak positive relationship between the SWM variable and the ERV variable in households in the Santa Monica - Chota sector, 2023.

It was identified that the management of SWM in households in the Santa Monica - Chota sector, 2023 is practiced regularly in the dimensions generation, storage and location, and transfer of SR, as well as in the variable SWM.

It was identified that the ERV in households in the Santa Monica - Chota sector, 2023 is regular in its dimensions reuse, separation of organic and inorganic SW, as well as the ERV.

It is established that the relationship between the dimensions of the SWM and the dimensions of the ERV in households in the Santa Monica - Chota, 2023 sector is weakly positive, obtaining values from 0.247 to 0.477 with bilateral significances from 0.001 to 0.034, data less than 0.05% error where ($p < 0.05$), results that accept the hypothesis proposed.

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