ANALYSIS OF THE ACUMULUM AND DISPOSAL METHOD OF ASSETS IN PUBLIC ORGANS

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ABSTRACT

This paper discusses the patrimonial assets generation and decommissioning in public agencies, based on the National Solid Waste Program (NSWP) and Federal Law No. 12.305/2010. From the application of questionnaires, the typology, quantities, storage forms, environmental impacts and human health were evaluated, according to the opinion of the patrimonial agents of public agencies on the accumulation and the disposal process the Unserviciable Solid Waste (USWs). It was identified that the awareness of the servers and students, the commitment of the managers, the implementation of a Solid Waste Management Program, public procurement with quality and the simplification of procedures are relevant in the management of USWs. For the definition of the priority items, it was used the AHP method, based on the criteria: physical space, environmental impact and health, easiness of disposal, state of conservation of the good and model of breakdown, arriving at the conclusion that the information technology equipment should be a priority for the decommissioning. The planning of appropriate storage sites, the commitment of agents and managers, the improvement of legal mechanisms and the maintenance performance are priority actions in the management of USWs of the studied institution.

KEYWORDS: solid waste, sustainable public procurement, environmental management, multicriteria decision support, AHP.

ANÁLISE DO ACÚMULO E MÉTODO DE DESCARTE DE BENS PATRIMONIAIS EM ÓRGÃOS PÚBLICOS

RESUMO

Este trabalho debate sobre a geração e desfazimento de bens patrimoniais em órgãos públicos, com base no Programa Nacional de Resíduos Sólidos (PNRS) e na Lei Federal Nº 12.305/2010. A partir da aplicação de questionários, avaliou-se a tipologia, quantidades, formas de armazenamento, impactos ambientais e à saúde humana, segundo opiniões dos agentes patrimoniais de órgãos públicos sobre o acúmulo e processo de desfazimento dos Resíduos Sólidos Inservíveis (RSIs). Identificou-se que a conscientização dos servidores e alunos, comprometimento dos gestores, implantação de um Programa de Gerenciamento de Resíduos Sólidos, compras públicas com qualidade e a simplificação de procedimentos são relevantes na gestão dos RSIs. Para definição dos itens prioritários, foi utilizado o método AHP, tendo como base os critérios: espaço físico, impacto ambiental e a saúde, facilidade de desfazimento, estado de conservação do bem e modelo de desfazimento, chegando-se à conclusão de que os equipamentos de informática deveriam ser prioridade de desfazimento. O planejamento de locais apropriados de armazenamento, o comprometimento dos agentes e gestores, o aprimoramento dos mecanismos legais e a realização de manutenção são ações prioritárias na gestão dos RSIs da instituição estudada.

PALAVRAS-CHAVE: resíduos sólidos, compras públicas sustentáveis, gestão ambiental, auxílio multicritério à decisão, AHP.

1. INTRODUCTION

About 1.4 billion tonnes of urban solid waste (SW) is produced annually - a world average of 1.2 kg per day per person - with developed countries accounting for about half of the total. The United Nations estimates that by 2025, garbage generation will reach 2.2 billion tons per year and by the middle of this century will reach 4 billion tons per year (WESTMORELAND, 2014). Brazilians daily generate 218,874 tons of SW, which represents 1.07 kg of garbage per capita. In 2015, about 42.6 million tons of SW (58.7%) collected went to adequate disposal (sanitary landfills) and 30 million tons for inadequate disposal, such as dumps or controlled landfills that do not have the range of systems and necessary measures to protect the environment (ABRELPE, 2015).

Solid waste management is essential to guarantee society the constitutional right to a healthy environment and public health (SHAFQAT; NOOR; FATIMA, 2014). The inadequate management of solid waste causes a number of harmful social and environmental impacts, among them: the dumps formation, slurry production, greenhouse gases generation, vector animals proliferation, among others. It is important to stress that good SW management must consider as priority elements the reduction of its generation, the reuse of items and the recycling diversification (MAGERA, 2013).

The National Policy on Solid Waste established by Federal Law No. 12,305/2010 (BRAZIL, 2010) establishes that waste management must always be carried out in an integrated manner, covering all stages and all waste, in addition to aiming at sustainability, which reiterates the need to include social, environmental and economic aspects (VIEIRA, 2013, DEUS; BATTISTELLE; SILVA, 2016). In addition to this important legal aspect, it is up to society to rethink the ways of solid waste management and to help in the search for new solutions, from an educational process. It is fundamental for the resolution of the problem that the reflection also reaches the Public Institutions, in which the solid waste generation is also characterized by the existence of several unserviceable assets in the form of Unserviciable Solid Waste (USWs) and its disposal consists of an exclusion process from the assets of the institution.

Integrated solid waste management encompasses the acquisition, collection, transference, resources recovery, recycling and treatment of these wastes that occurs from the purchasing process of a particular good until its final moment, when classified as inappropriate for use. This means that the waste accumulation is directly linked to its acquisition process until it will be considered unserviceable, due to the loss of some factors related to its real uses (RODRIGUEZ; GIACOMELLI SOBRINHO, 2013; SHAFQAT; NOOR; FATIMA, 2014).

Decree No. 99,658/1990 regulates the reuse, movement, alienation and other forms of material decommissioning within the scope of the Federal Public Administration (BRAZIL, 1990). This process can be by transfer, assignment, disposal (sale, exchange and donation) and destruction or abandonment, being authorized under an inventory realization by specific commission, or as needed (TORRES; BORGER, 2013).

The solid waste management decision-making complexity has increased considerably in recent years, with strong pressure on public agencies to regulate waste management policies in order to encourage other organizations. The norms and laws application for the dismantling realization of the assets in public agencies make these processes slow, while the inservices are generated daily, entailing the accumulation of them. This requires a cultural and legal change so that public authorities can carry out more inclusive decision-making processes, both in planning and in decision strategies (GARNETT; COOPER, 2014).

Unscheduled purchases, obsolete goods and use damages, among other factors, are responsible for the increase in the amount of goods that can not be sold in public agencies. The

unserviceable goods existence of various modalities in public agencies is a great concern for managers, who need to carry out the disposal of these goods in the form of USWs, through bureaucratic processes provided by law (BRAZIL, 1990). The spaces occupied by USWs within public institutions could be used for other more useful purposes, which would prevent the generation of unhealthy areas by the accumulation of dust and mold, or harboring urban and poisonous pests such as rats, bats, snakes, scorpions, spiders, cockroaches, among others capable of generating diseases and endangering the life of the servers and the general public (MUCELIN, BELLINI, 2008).

This paper aims to identify the generation, storage and disposal processes of solid waste in the form of unserviciable patrimonial assets to public agencies and their implications for sustainability, based on a case study at the Federal Teaching Institute (FTI). The diagnosis and problematization of USW accumulation and disposal methods was performed through the application of questionnaires. The Analytic Hierarchy Process (AHP) method was used to define which item should be discarded as a priority, in addition to the discussion of proposals for a Solid Waste Management Program at the institution.

2. LITERATURE REVIEW

Some definitions are important for the understanding of the legislation and its diligences, in addition to the comprehension of the analysis carried out in this paper, which are presented in topic 2.1 and 2.2.

2.1 Sustainability and Solid Waste

Although the garbage generation in Brazil increased 29% from 2003 to 2014, it suffered a 2.04% reduction in 2016 compared to 2015, the first time a decrease of solid waste is presented. Between 2015 and 2016, the population grew by 0.8% and the SW generation per capita showed a slight fall, from 1.07 to 1.04 kg / day. Total generation, in turn, reached the equivalent of 214,405 t / day of SW generated in the country, a reduction of 2% in relation to 2015, with a total annual of 78.3 million tons in the country (ABRELPE, 2016).

In addition, this inadequate management contributes to the increase of vector proliferation, such as rats and insects, particularly in Brazil, the case of the Aedes Aegypti mosquito - dengue vector, zika virus and chikungunya. Furthermore, it potentiates flooding effects due to obstruction of rainwater networks in Brazilian cities, causing great economic losses and transmitting diseases, among other problems (HEMPE; NOGUERA, 2012).

The concern about sustainability is reinforced by government actions, through a joint initiative of four Ministries: Planning; Environment; Mines and Energy, with the program "Social Development and Fight against Hunger" (Sustainable Esplanade Project - SEP), which aims to improve the quality of public expenditure by eliminating wastage and continuous improvement of process management, as well as raising awareness among managers and public servants regarding socio-environmental responsibility (GARCIA, 2013; BRAZIL, 2014; GARNETT; COOPER, 2014).

Federal Law No. 12,305, August 2, 2010, which establishes the National Solid Waste Policy (NSWP) in its Article 3, Chapter VII, included, in the concept of final destination, the "appropriate destination" modality as: destination of waste including reuse, recycling, composting, recovery and energy utilization or other destinations accepted by the competent bodies (DEUS; BATTISTELLE; SILVA, 2016).

Under the law, waste management must always be triggered in an integrated manner covering all stages and all waste, as well as considering political, economic, environmental, cultural and social dimensions. This must be carried out under social control and with a view to sustainable development, which reiterates the need to include social, environmental and economic aspects. (VIEIRA, 2013; REICHERT; MENDES, 2014).

Sustainable waste management requires a holistic approach involving a range of stakeholders. The major difficulty lies in the choice of how different stakeholders in the issue would work cooperatively, to make the decision better (CANIATO; TUDOR; VACCARI, 2015).

Castro, Silva and Marchand (2015), along with Polaz and Teixeira (2009), consider that these aspects can be evaluated in the municipal solid waste management and management systems through sustainability indicators, in this way, they ultimately evaluate the municipal management of USW. The main sustainability indicators described include: 1) collection system configuration; 2) infrastructure (facilities and equipment); 3) financial sustainability; 4) provision of services (collection, transportation, handling and final disposal); 5) human resources involved; 6) social extension (integration between the system and society); 7) legal compliance with relevant legislation; 8) environmental impacts.

According to Lima et al. (2014), it is possible to propose technologies and respective arrangements to evaluate and decide on the appropriate SW treatment, through multicriteria methods of decision support, such as Analytic Hierarchy Process (AHP) and Preference Ranking Organization Method for Enrichment Evaluations (Promethee II). The authors compared the treatments of SWs by means of recycling, composting, biological mechanical treatment, anaerobic digestion, incineration with combined cycle electric power generation (electric and thermal energy), landfill with and without power generation. These technologies were ranked according to four criteria: environmental, social, economic and political.

Economic sustainability in this type of treatment is also fundamental. In some cases, total costs can increase significantly, raising the rates of residential, business, commercial and institutional collections. When fees are not sufficient to cover costs, a greater involvement of the private sector itself is needed in order to increase profitability and balance revenues with public-private partnerships (LOHRI; CAMENZIND; ZURBRÜGG, 2014). Strategic partnerships should be undertaken as a form of cost optimization for stakeholders (CHRISTENSEN et al., 2014).

Law No. 9,795/1999, which deals with the National Policy on Environmental Education, in its Article 1, records that the environmental education of the individual and the community build social values, knowledge, skills, attitudes and skills aimed at the conservation of the environment, good of common use by people, essential to life quality and its sustainability (VOGELMANN JÚNIOR, 2014).

Solid waste generation in public agencies is directly proportional to the acquisitions. In this context, the public administration must also promote socio-environmental responsibility in its purchases. This process should also prioritize environmental criteria, not only the economic and lower price ones (BRAZIL, 2014).

Decree No. 7,746/12, in its Article 10, regulates Article 3 of Law No. 8.666 / 1993, which establishes general criteria, practices and guidelines for the promotion of the sustainable national development of the contracting done by the federal public administration, autarchic and fundational, and establishes the Interministerial Commission for Sustainability in Public Administration (ICSPA), that aims to implement sustainability criteria, practices and actions in public administration (BRAZIL, 2012).

According to Decree No. 99.658/90 (BRAZIL, 1990), Article 1, the reuse, movement and disposal of material, as well as other forms of its elimination, within the scope of the Federal Public Administration, are regulated by classifying such assets as: a) idle - when, although in perfect conditions of use, it is not being used; b) recoverable - when its recovery is possible and budgets, within the scope, fifty percent of its market value; c) uneconomical - when its maintenance is costly, or its precarious income, due to prolonged use, premature wear or obsolete recovery is more than 50% of the value of its acquisition; d) irrecoverable - when it can no longer be used for its intended purpose due to loss of its characteristics or because of the economic impossibility of its recovery.

The elimination of assets in public agencies consists in the exclusion of a property from the heritage collection. Therefore, this classification of classified goods as unserviciable must be performed to avoid the disposal of an asset in good condition. The goods disposal should permeate the identification of their unsustainable liabilities, quantitative and qualitative screening, priorities through options of allowances allowed by law, cost evaluation, monitoring of the removal of the plates of tipping and verification of the final disposition aiming sustainability (BRAZIL, 2014; CASTRO, 2015).

In the FTIs and other public agencies, unscheduled purchases, obsolete goods, damage due to time of use, among other factors are responsible for the increase, almost daily, in the amount of goods that can not be sold in these bodies, in the form of USWs. The destination of these wastes, the environmental concern, the occupied spaces, venomous animals and insects presence, the negative aspects with gases emission and diseases transmission originating from this problematic, are factors that cause public agencies to question how to mitigate the impacts caused (MUCELIN; BELLINI, 2008).

2.2 AHP method

The Analytic Hierarchy Process (AHP) method was designed by Saaty in the 1970s, been widely used to solve complex problems with several alternatives and various criteria. The method aims to obtain the most viable alternative in light of several criteria for a given group analyzed. The method is structured in three principles, which are: construction of hierarchies, priorities definition and logical consistency. Therefore, the basic steps of this process that are related to these three principles are hierarchical levels, definition of priorities and consistency (COSTA, 2006; SAATY, 1980; SHANG, 2011).

According to Russo and Camanho (2015), in order to make a good decision by AHP, the manager must know and define the problem, the purpose or decision necessity, the criteria and sub-criteria to evaluate the possible alternatives, actions that can be taken and affected or interested parties by the decision.

The steps taken in the method are as follows: to determine and define the problem - the choice is given according to its importance or complexity of resolution. In defining and selecting a problem, it is important to make explicit the assumptions and perspectives for decision making. Hierarchical structure of the decision - it is built from top to bottom, having above the goal or goal of the decision, passing through the intermediate level placing the decision criteria to the base where the set of possible alternatives is presented.

The decision hierarchy size should be sufficient to include key concerns of managers in order to allow timely changes. At this stage, decision-makers should eliminate alternatives considered impractical or that do not meet the criteria considered to be really relevant.

1) Matrix construction from the criteria and subcriteria: each criteria at a higher level is used to correlate to the subcriteria at the level immediately below, repeating the process to the last criterion. The matrix is constructed for each criteria in the upper level, the scalar correlation to show the degree of importance or predominance one criteria over the other.

2) Calculate the matrix elements relative weight:

(I) Add the columns value to normalize the matrix;

(II) In the normalized matrix, add the rows to obtain the priority relation of the criteria;

(III) Evaluate matrix consistency by calculating the eigenvalues and compare the random consistency according to the size of the matrix. If there is a consistency problem, you should review the comparisons. To calculate the logical consistency we use Equation 1.

$$RC=IC/IR \qquad (1)$$

Where IR is Random Consistency Index determined by Saaty and to calculate the Consistency Index (IC), Equation 2:

$$IC = (\lambda máx - n)/(n-1) \qquad (2)$$

Since λmáx is the largest eigenvalue of the judgment matrix. Saaty suggests that RC should be less than 0.1.

(IV) For each criteria, the previous steps must be done;

(V) Each alternative values for each criterioa are inserted in the matrix, according to the priority determined previously;

(VI) Add each alternative values to obtain the final value, the alternative that has the highest value (priority) is selected.

3) Decision consistency verification: in this phase the validation of the results obtained by the application of the method is verified, and if they are compatible with the manager expectations and possible faults identification that need to review the previous process.

4) Decision documentation: the decision making documentation and the process that generated it must be recorded as it is useful to justify the steps and subsidize the evaluation and future analyzes.

The importance judgment scale recommended by Saaty (1991) goes from 1 to 9, with 1 meaning the indifference of one criteria importance of in relation to the other, and 9 meaning the extreme importance of one criteria over another, with intermediate stages of importance between these levels 1 and 9. Furthermore, disregarding the comparisons between the own criteria, which represent 1 in the scale, only half of the comparisons need to be made, because the other half is made up of reciprocal comparisons in the matrix of comparisons, which are the reciprocal values already compared.

3. MATERIALS AND METHODS

The work was conducted in September 2016 at a Federal Institute of Education, Science and Technology. This teaching institution is composed of 26 units distributed in four mesoregions of the State of Rio de Janeiro, among them: northern, northwestern, coastal lowland and metropolitan.

3.1 Survey Analysis

A survey analysis, with questionnaires, was carried out to obtain quantitative and qualitative data, along with 90% of patrimony agents, according to Godoi and Balsini (2010). Fifteen experts were identified in the control, distribution and decommissioning process of USWs, who were argued about the quantity and typology and occupied area by the unserviceable assets, initiatives and related projects, and the main reasons that lead to the USWs generation, besides highlighting strategies to mitigate the problem. The questions were formulated based on the Likert scale, with notes being given to the answer alternatives: I fully agree - note 5, partially agree - note 4, neither agree nor disagree - note 3, partially disagree - note 2 and strongly disagree - note 1, besides the possibility of not expressing opinions (Figure 1).

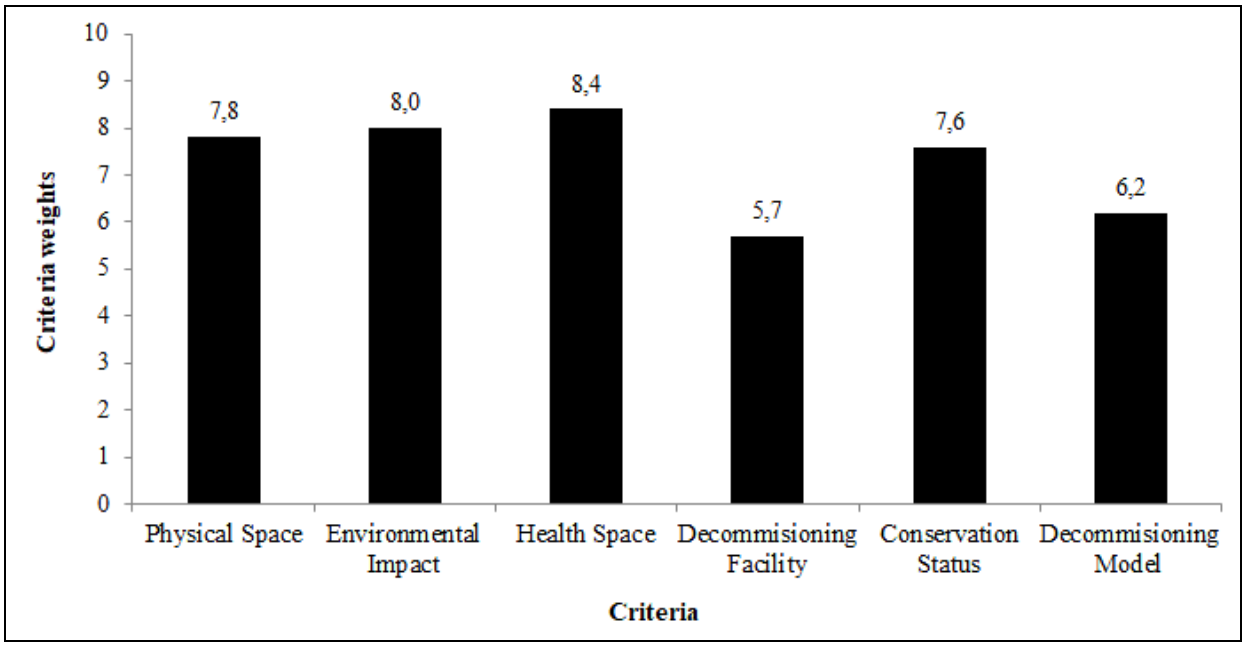

Figure 1 - Allocation of relevance to the criteria for decommissioning.
Source: Elaborated by the authors.

3.2 Definition of evaluation criteria

Based on the objective of defining priority procedures for USWs decomminsioning, the AHP method was based on the Survey analysis, by which it was possible to define the main items that make up the USWs, among them: furniture, household appliances, electronics and computer equipment. These items were considered as the alternatives of the decision problem.

The alternatives for the decommisioning were judged in the light of six criteria, defined by the patrimonial agents as important elements associated to the USWs. The criteria used were: 1) the physical space occupied by USWs (minimization criteria, the smaller the better), 2) the environmental impact of the USWs (minimization), 3) the health impact caused by the presence of USWs (minimization), 4) decommisioning facility of the USWs modality according to norms and laws (maximization, the greater the better), 5) the USWs conservation status taking into account the possibility of maintenance, reuse, auctioning or donation (maximization) and 6) the decommisionig model with the URSW modality according to norms and laws (maximization, the greater the better); based on previous experience - donation, auction, trading, barter, among others (maximization).

A second questionnaire was elaborated and applied to 10 patrimonial agents, selected based on their experiences, time of dedication to patrimonial activity and notorious knowledge in the area. This data collection instrument sought to evaluate their perceptions about the alternatives of

breakdown for each criteria defined in the problem. In the same questionnaire, the experts were encouraged to measure the criteria weight.

The alternatives judgment in the light of each criteria and the weighing of the criteria was performed through a value scale with options from one to ten. The data were treated by descriptive statistics, mean and standard deviation. The computational program IPÊ 1.0 was used to calculate the matrices and the problem consistency ratio. The proposed model hierarchical structure can be seen in Figure 2.

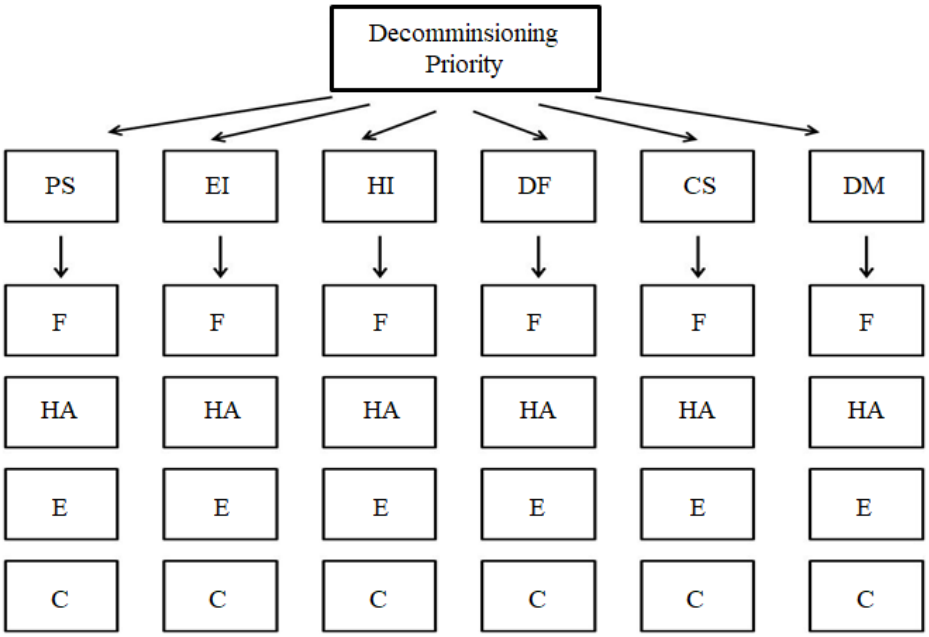

Figure 2 - Hierarchical structure of the proposed problem. Legend: 1) criteria: (PS) physical space, (EI) environmental impact, (HI) health impact, (DF) decommisioning facility, (CS) conservation status, (DM) decommisioning model; 2) USWs category: (F) furniture, (HA) household appliance, (E) electronics and (C) computing.
Source: Elaborated by the authors.

4. RESULTS AND DISCUSSION

The problems related to the FITs, like any public agency, also go through the mitigation of the unserviciable solid waste (USWs) generation, as much for the improvement of administrative purchasing processes as for the debureaucratization of the patrimony outflow processes and decay.

In the first case, purchases should guarantee more durable and quality products through the updating of public bidding rules and regulations. As the second point, the problem is aggravated by the need for equity actions for short-lived assets, which could be leased, in addition to reducing the forms of liquidation provided for by law. Thus, these arguments contribute to the USWs accumulation in public institutions. In Figure 3, the average Likert concordances for questions 1 to 6 are represented.

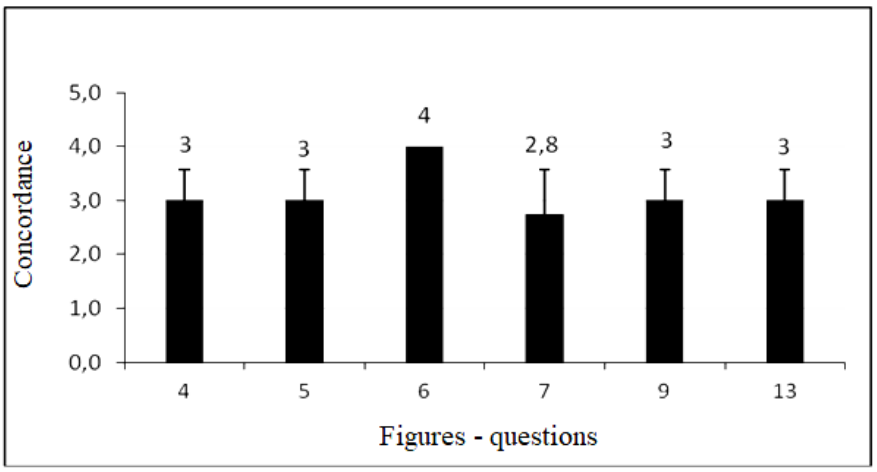

Figure 3 – Average Likert concordances for questions 1 to 6.
Source: Elaborated by the authors.

4.1 AHP method application

The multicriteria analysis was used with the purpose of assisting in the decision making process for unserviceable assets decommisioning in public educational institutions, categorizing the USWs modalities according to their importance to the equity sector. Thefore, the criteria average weights were assigned, in accordance with the respondent patrimony agents, in order to initiate the multicriteria analysis processes by the AHP method.

The most important criteria, in the experts' opinion, refer to the impacts on human health (weight 8.4) and USWs presence in educational institutions. Then, the physical space occupied by USWs, their environmental impacts and their conservation status were also weighted in importance, ranging from 7.6 to 8.0. The less important criteria considered were " decommisioning facility " (weight 5.7), which refers to the bureaucratic process of undoing the good itself, with degrees of complexity being different between them; and " decommisioning model" (Weight 6.2), which refers to the process type that will be adopted (trading, exchange, donation, etc.). These are shown in Figure 1, represented above.

According to this degree of relevance it was possible to establish the parity matrix, according to the degrees of judgment of importance proposed by Saaty (1980). This allowed the construction of the following matrix, shown in Figure 4, where the criteria were matched, being (C1) physical space, (C2) environmental impact, (C3) health impact, (C4) decommisioning facility, (C5) conservation status e (C6) decommisioning model.

CRITERIA MATRIX

	C1	C2	C3	C4	C5	C6
C1	1	1/2	1/3	5	2	4
C2	2	1	1/3	6	3	5
C3	3	3	1	7	4	6
C4	1/5	1/6	1/7	1	1/5	1/3
C5	1/2	1/3	1/4	5	1	4
C6	1/4	1/5	1/6	3	1/4	1

PRIORITIES

C1 = 0,161
C2 = 0,231
C3 = 0,399
C4 = 0,033
C5 = 0,121
C6 = 0,056

RC = 0,059

Figure 4 - Parity comparison matrix between the criteria under study.
Source: Elaborated by the authors.

According to the results obtained, the criteria presented the following degree of importance in descending order of C3, C2, C1, C5, C6 and C4. In addition, the Saaty consistency ratio (RC) was less than 0.1, therefore tolerable and no further judgment was necessary.

The USRWs modalities were divided into furniture, household appliance, electronics and computing. The computing goods include computers, related and their peripherals, such as printers, monitors, transformers, scanners, among others. Those categorized as household appliances include equipment that is used in academic restaurants, kitchens and support cups, also sometimes in administrative offices, refer to refrigerators, freezers, stoves, drinking fountains, microwaves, refrigerators and the like. Different from the latter, the so-called Electronics include fans, air conditioners, hydraulic pumps, machines and laboratory equipment, such as vacuum pumps, hoods, hoods, air compressors, electronic scales and correlates. Finally, the Furniture modality was divided into goods made of wood and formic, or metal and plastic, consisted by chairs, tables, cabinets, shelves and other furniture.

Considering the responses obtained from the patrimonial agents according to the six established criteria, it was observed that the computing goods (weight 6) and household appliances (weight 6) were prioritized in relation to the electronics (weight 5) and furniture (weight 4). This possibly occurred due to the elimination processes that include trading, barter, assignment, donation and destruction or abandonment (Decree No. 99.658/90). Processes generally involving a lot of bureaucracy and execution time, which, associated to the large volume of goods in this modality and the ease with which they are damaged, consequently become of greater volume, making them a priority for discarding.

All modalities conservation status was considered as weightings 6 by estate agents. In that case, two strands can be pointed: the first one refres to severaly damaged goods that should be forwarded to proper recycling, and the second one, which refers to unserviceable goods thay may be in a conservation statuts that can be reused by other interested parties, in such a way as to increase their chances of being discarded.

The computing equipments (weight 6) seem to be easier to discard than the do que the other modalities (weight 5), according to the patrimonial agents' opinion. Increasingly, new recycling companies are emerging in the market and increasingly specialized in certain solid waste. It is the case of companies that recycle computing equipment that recover metals avoiding environmental contamination (SCHALCH et al., 2002).

Regarding the health impact criteria, the computing, electronics and household appliances obtained the same degree of relevance (weight 7) as furniture (weight 5). This result presents a reflection on the goods physical constitution, considering that furniture mostly consists of wood, plastic and iron, raw materials that normally do not affect human integrity in its original state.

In the same line of thought, the environmental impact criteria presented the same relevance (weight 8) for computing and electronic devices, although household appliances (weight 7) were very close and furniture (weight 5) appeared with a considerable difference to the rest. These results can be justified considering that computing equipment, electronics and household appliances have parts such as bearings, compressors, peripherals, among others that in their constitution contain substances harmful to the environment (DEMAJOROVIC et al., 2012).

Finally, the physical space criterion presents, through the agents opinion, equal and greater relevance for informatics and furniture goods (weight 8) and consumer electronics and household appliances (weight 7) less relevant, but with little difference of values. This result presents a demonstration that the physical space occupied by all the unserviceable goods in all modalities is a worrying and critical criteria, which lead to the conclusion that there is a great need to prioritize the

waste products disposal, in such a way, that unduly occupied spaces are released to attend to their primary activities.

The criteria and their respective weights are set forth in Figure 5.

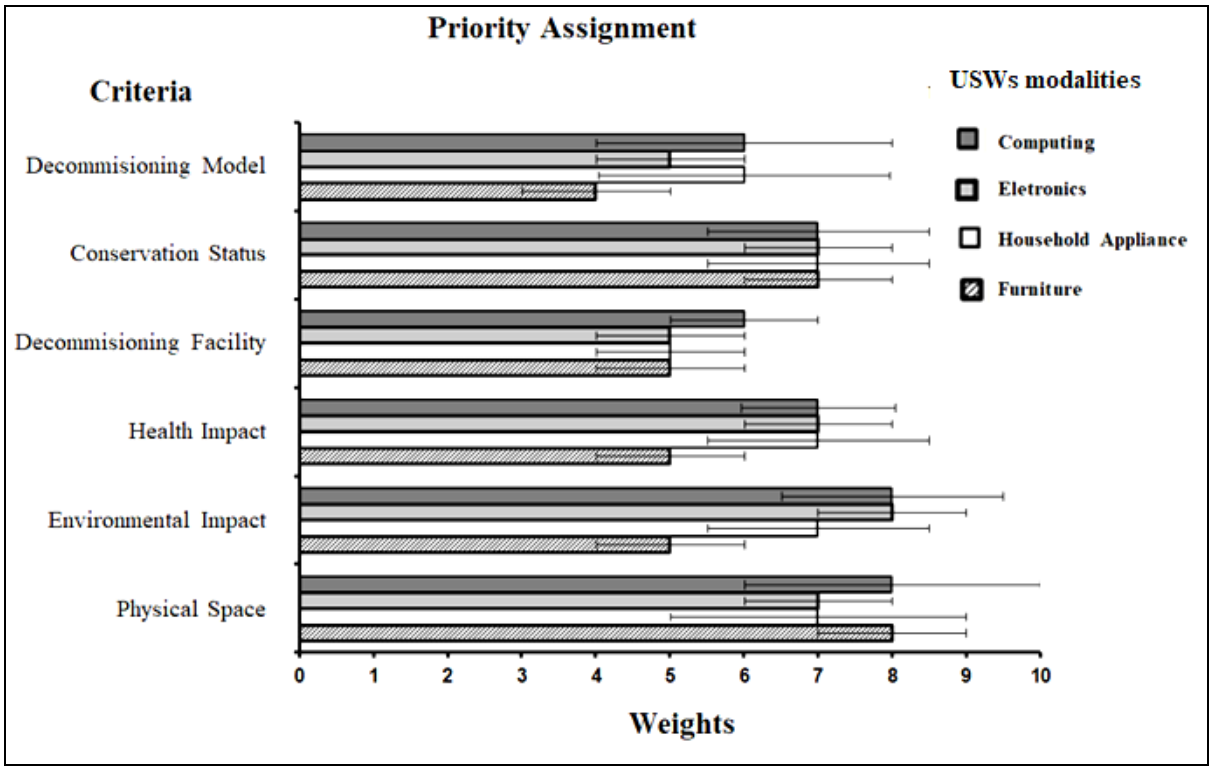

Figure 5 - Allocation of weights according to the modality and criteria for decommissioning.
Source: Elaborated by the authors.

These USWs modalities were judged in light of each criteria adopted in the main parity matrix, allowing the generation of six alternative matrices. It is important to emphasize that the comparison most important element is always used as an integer value of the scale, and the least important as the inverse of that unit.

If the line-element is less important than the matrix column-element, we enter the reciprocal value at the corresponding position of the array. Due to the reciprocity relationship and the need for consistency between two activities or criteria, the values reciprocal above zero are inserted in the matrix created when a comparison between two activities has already been performed. The process is robust, because subtle differences in a hierarchy in practice do not become decisive. The matrices thus obtained can be observed in Figure 6.

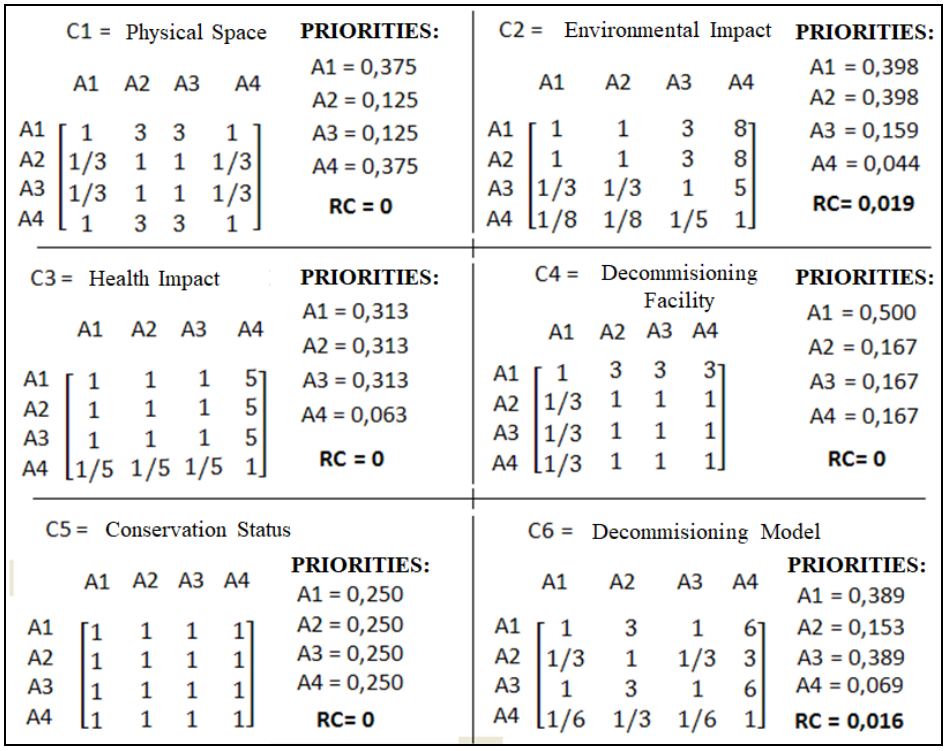

Figure 6 - Priority matrices in the light of the criteria: (A1) computing, (A2) eletronics, (A3) household appliance e (A4) forniture.
Source: Elaborated by the authors.

Figure 7 allows the priority degree visualization in the process of disbanding the accumulated USWs in federal public education units in light of the criteria and balancing weights proposed by the patrimony agents. The computing goods are the most priority (34.51%) in comparison to electronics (28.02%) and household appliances (23.66%). The furniture, despite having a large number of patrimonial assets, does not appear to be the priority of the breakdown (13.82%) and this is justified by the low relevance of the environmental impacts and the health that these goods can cause.

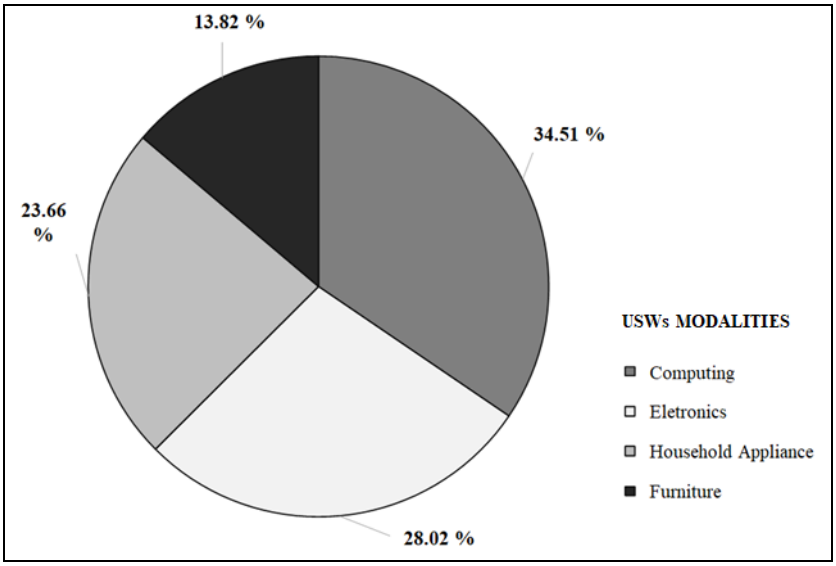

Figure 7 - Final result of multicriteria analysis.
Source: Elaborated by the authors.

4.2 Perspectives for a Solid Waste Management Plan (SWMP)

Analyzing the suggestions and proposals provided by the patrimony agents, a Solid Waste Management Plan (SWMP) was elaborated, containing nine topics, for an ideal disposal process in public educational institutions:

1) Training and awareness of the servers for integrated solid waste management. In this way, the servers are expected to be committed and responsible for the assets, avoiding improper use, damage, unnecessary purchases and the accumulation of waste products;

2) The commitment of the managers is essential for the strategic measures to provide satisfactory results. The implementation of a SWMP begins with the participatory action of the manager who will propose and seek physical, financial, human and environmental alternatives to carry out the program;

3) From the SWMP implementation, it will be possible to carry out studies, projects and consolidation of partnerships that will optimize the use of the waste and minimize its accumulation. Study of improvements for reuse and USWs reuse, projects that encourage students to carry out researches and studies with computer equipment and partnerships with recycling companies;

4) Implement new purchasing models, aiming at quality, cost-effectiveness and sustainability, having as legal protection the Public Bidding Law (Law No. 8,666/93) and its updates;

5) Look for debureaucratization mechanisms at all stages of disposal of wasteful assets. In this regard, it is fundamental the manager's commitment to seek procedures simplification and norms of alienation, in order to facilitate the discarding of USWs without harming the Laws;

6) Preventive maintenance plan implementation, which implies the hiring of labor, physical space and equipment for the repair of damaged goods, but which can be recovered;

7) Campus autonomy, in the Federal Institutes cases, to carry out the process of elimination, reducing the procedures and the bureaucracy to carry out the discards;

8) Cultural change in the organization, from the awareness of all the involved entities: servants and students. It is necessary to clarify and make everyone aware that public goods are not free. These are acquired through the taxes and taxes paid by the company and therefore should be well used and taken care of. To care for the public good is the obligation of all;

9) Finally, the planning of adequate spaces for the storage of USWs. Every construction project should prioritize a deposit to carry out this activity. The creation of safe environments for this purpose would minimize risks to human and environmental health. However, if the previous steps are met, the accumulation of waste and the probability of occurrence of these risks will be minimized.

Environmental Education is the most effective mechanism for raising the citizens awareness who are able to act holistically with the environment in which they live. Through awareness-raising projects and the application of ideal techniques for environmental preservation, it will be possible to envisage a horizon of alternatives that will make people aware and responsible for their actions, guaranteeing future generations the life quality they need.

The research shows that the current models of disbanding in public agencies are plastered by several factors that make it difficult to carry out the processes. Laws that establish norms and standards make it difficult to carry out adequate de-nuptialization and reduction of accumulated

waste. On the other hand, some legal operating methods do not allow flexibility of the currently executed models.

It was also identified the need for training, awareness and the employees commitment who work in public agencies, so that they can contribute to the care and zeal for the acquired goods, avoiding improper handling, unnecessary exchanges, misuse, among other attitudes that will preserve the assets. It is important to stress that all actions taken to improve the server must be backed by the managers commitment, which together must be aware of the measures and changes required for a solid waste management program that meet the demands of the sustainability.

The lack of an adequate environment for the goods preservation that accumulate over time brings with it some critical problems for public agencies, such as pests that settle in the midst of wasteland and environmental impacts.

5. CONCLUSION

The paper raised some points that need to be reviewed by both the servants and the managers and also by the organs of maximum power, seeking to re-evaluate the Laws governing public processes. Training, capacitation, and awareness are important methods for a SWMP, but legal changes are required to regulate, base and support measures that are effective for the proper management of solid waste accumulated in public agencies.

As a first step, it is fundamental that the maximum manager of each body is committed to solving the problem and is committed to apply the possible ways of breaking down the generated waste, seeking viable and legal alternatives that will give sustainability to decision making. For example, create a project to reuse goods, especially those of computing ones, which can be used in laboratories as a learning base for the students of the respective area. Also could be set up repair workshops for furniture. Another alternative would be partnerships with private companies to recycle assets that are diagnosed as unusable for the public agency.

In all the campuses surveyed, it was found that there are no proper spaces for the storage of these goods, these spaces are determined by demand, that is, as it arises, the USWs are adapting spaces destined to other purposes for this process. This proves a deficiency of planning, since in the project of construction of the Institutes are not sized places to guard the inservable goods, however, from the first day of existence of the campuses already begin to appear the USWs. Hence the proposal of a maintenance program that should operate using the 4 "Rs" method – reduce, reuse, reuse and recycle through predictive, preventive and proactive measures.

In addition to these managerial measures, it was observed the need to prepare a pilot plan to carry out the solid waste management program and the acquisition of servers to operate in the sectors related to the disposal process, the latter can improve, with greater openness code of specific vacancies, which will acquire through public tenders, human resources with the appropriate competencies to act in the area in question, so that there is improvement in the respective management process and in the legal scope.

In order to complement the above suggestions, it is important to emphasize that the qualification and qualification of employees in the public service in this specific area are of great relevance for the processes of USWs decommissioning in public agencies to be carried out with greater quality, truthfulness, lower cost and aiming at environmental sustainability.

Incentives should be given to a marketdevelopment, production and consumption of products derived from recycled and recyclable materials. If properly managed, these solid wastes will acquire commercial value and may be used in the form of new raw materials or new inputs.

The implementation of a Management Plan will have positive impacts in the social, environmental and economic spheres, since it not only tends to reduce the consumption of natural resources, but also generates labor, employment, direct and indirect income and leads to social inclusion and environmental impacts caused by inadequate waste disposal. In addition, preventive and corrective actions should be included in planning.

Reiterating that all decisions must be supported by legal measures, such a way as the patrimonial descrease is carried out properly without compromising financial public property. For this, it is fundamental the real commitment of the manager, who will go along with the other managers, to request the public power the legal protection for all its deliberations, with the changes in norms and Laws that govern the decommissioning processes of unserviceable goods in public agencies.

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