Revista de Gestão Ambiental e Sustentabilidade – GeAS
Organização: Comitê Científico Interinstitucional/ Editora Científica: Profa. Dra. Cláudia Terezinha Kniess

Recebido: 21/09/2017- Aprovado: 29/06/2018
DOI: https://doi.org/10.5585/geas.v8i1.13766
E-ISSN: 2316-9834

CIVIL CONSTRUCTION WASTE MANAGEMENT PLAN: A SYSTEMATIC REVIEW OF THE BRAZILIAN SCIENTIFIC PRODUCTION FROM 2003 TO 2016

Patricia Loch[1]
Sandra Mara Stocker[2]
Geysler Rogis Flor Bertolini[3]

ABSTRACT

Objective of the study: To present a systematic review of the civil construction waste management plan published between 2003 and 2016 in the evaluation area of 'Capes administration, accounting and tourism' with classification in the Qualis system of Capes in strata A1 to C.

Methodology/approach: This research of qualitative and quantitative approach and exploratory character was based on a literature and documentary research conducted in October and November 2016 and analyzed 18 studies that approached the Civil Construction Waste Management Plan (CCWMP) in some way.

Originality/Relevance: The subject is still relatively new in Brazilian scientific research.

Main results: As main results, all selected articles were linked to sustainability, with emphasis on the harmful impacts that the activity causes to the environment.

Theoretical contributions/methodological: The dissemination of the theme in the academic, social and business environments is considered as a theoretical/methodological contribution.

Conclusion: a mapping of the main approaches concerning the research theme and behavior in Brazil was carried out.

Keywords: Civil construction. Waste management. CCWMP. Waste management plan.

[1] Mestre em Administração - Universidade Estatual do Oeste do Paraná - UNIOESTE. Cascavel, Paraná – Brasil. ORCID: https://orcid.org/0000-0001-6698-4848. E-mail: patricialoch13@gmail.com
[2] Doutor em Engenharia de Produção - Universidade Estatual do Oeste do Paraná - UNIOESTE. Cascavel, Paraná – Brasil. ORCID: https://orcid.org/0000-0001-9424-4089. E-mail: geysler.bertolini@unioeste.br.
[3] Doutora em Desenvolvimento Regional e Agronegócio - Universidade Estatual do Oeste do Paraná - UNIOESTE. Cascavel, Paraná – Brasil. ORCID: https://orcid.org/0000-0001-7452-9853. E-mail: sandra.lago@unioeste.br.

PLANO DE GERENCIAMENTO DE RESÍDUOS DA CONSTRUÇÃO CIVIL: UMA REVISÃO SISTEMÁTICA DA PRODUÇÃO CIENTÍFICA BRASILEIRA DE 2003 A 2016

RESUMO

Objetivo do estudo: Apresentar uma revisão sistemática sobre o plano de gerenciamento de resíduos da construção civil publicadas entre os anos de 2003 e 2016 na área de avaliação de Administração, Ciências Contábeis e Turismo da Capes com classificação no sistema *Qualis* nos estratos A1 à C.

Metodologia/abordagem: Esta pesquisa de abordagem qualitativa e quantitativa, e caráter exploratório, foi baseada em uma pesquisa bibliográfica e documental realizada nos meses de outubro e novembro de 2016 e analisou 18 estudos que abordaram de algum modo o PGRSCC.

Originalidade/Relevância: Assunto ainda é relativamente novo nas pesquisas científicas brasileiras.

Principais resultados: Todos os artigos selecionados estavam atrelados à sustentabilidade, com ênfase nos impactos nocivos que a atividade causa ao meio ambiente.

Contribuições teóricas/metodológicas: Disseminação da temática no meio acadêmico, social e empresarial.

Conclusão: Mapeamento dos principais enfoques em torno da temática e comportamento das pesquisas no âmbito brasileiro.

Palavras-chave: Construção civil. Gerenciamento de resíduos. PGRCC. Plano de gerenciamento de resíduos.

PLAN DE GESTIÓN DE RESIDUOS DE LA CONSTRUCCIÓN CIVIL: UNA REVISIÓN SISTEMÁTICA DE LA PRODUCCIÓN CIENTÍFICA BRASILEÑA DE 2003 A 2016

RESUMEN:

Objetivo del estudio: Presentar una revisión sistemática sobre el plan de gestión de residuos de la construcción civil publicadas entre los años 2003 y 2016 en el área de evaluación de Administración, Ciencias Contables y Turismo de la Coordinación de Perfeccionamiento de Personal de Nivel Superior (Capes) con clasificación en el sistema Qualis en los estratos A1 a C.

Metodología/enfoque: Esta investigación de abordaje cualitativo, cuantitativo y de carácter exploratorio se basó en una investigación bibliográfica y documental, realizada en los meses de octubre y noviembre de 2016 y analizó 18 estudios que abordaron de algún modo el plan de gestión de residuos de la construcción civil.

Originalidad/Relevancia: El tema sigue siendo relativamente nuevo en las investigaciones científicas brasileñas. Principales resultados: Todos los artículos seleccionados estaban

vinculados a la sustentabilidad, con énfasis en los impactos nocivos que la actividad causa al medio ambiente.

Contribuciones teóricas/metodológicas: Diseminación de la temática en el medio académico, social y empresarial.

Conclusión: Mapeamiento de los principales enfoques en torno a la temática y comportamiento de las investigaciones en el ámbito brasileño.

Palabras-clave: Construcción Civil. Gestión de Residuos. PGRCC. Plan de Gestión de Residuos.

1 INTRODUCTION

Since the expansion of the urban network of countries has been growing, especially in developing countries, the activities focused on civil construction have obtained greater representation, especially in the countries´ economies (Guerrero, Maas & Hogland, 2013). In this context, the civil construction segment shows a significant expansion. In Brazil, between 1994 and 2003, the sector grew 74.25%, mainly due to the expansion of the country's urban area (Sinduscon, 2014).

The sector remained on the rise between the years 2004 and 2013, with a GDP higher than the National GDP. The growth of the sector occurred during this period mainly due to government housing programs that significantly influenced the GDP of civil construction in the country, such as the Growth Acceleration Program - Urbanization of Precarious Settlements, which began in 2007; the National Housing Plan (PLANHAB) in 2008 and; the most relevant program that was 'Minha Casa Minha Vida' (PMCMV) and Land Regularization of occupied areas in 2009 and 2010 carried out together with the second phase of the Growth Acceleration Program (Brazil, 2013).

However, there was a small recession due to the economic crisis faced by the country (Souza, Oliveira, Santana, Viana Neto & Santos) between 2014 and 2015. In 2016, the segment begins to improve, which represents signs of recovery (Construbusiness, 2016). This growth shows several social and economic benefits, such as the development of the countries' economies, and the generation of jobs and income among families.

Simultaneously, the civil construction segment also causes harmful impacts on the environment, being responsible for consuming about 30% of the world's natural resources, mainly water and energy, without considering the use of the resources demanded to produce raw materials used in construction. In addition to the excessive use of resources, the activity is also responsible for a significant volume of waste (Yeheyis, Hewage, Alam, Eskicioglu & Sadiq, 2013; Brasileiro & Matos, 2015).

In 2014, the civil construction segment was responsible for 17 million tons of waste generated in the world, with estimates reaching 27 billion by 2050 (Guerreiro et al., 2013; Laurent, Bakas, Clavreul, Bernstad, Niero, Gentil, Hauschild & Christensen, 2014; Yeheyis, Hewage, Alam, Eskicioglu & Sadiq, 2013).

As explained above, the activity faces a dilemma, while on the one hand the economic and social benefits are relevant for the countries, on the other hand there are several environmental damages. The way society and the 'government' visualize the situation described and the concern with the future of the planet is in evidence, consequently, attention is focused on the construction sector (Yeheyis et al. 2013; Macêdo & Martins, 2015; Teixeira, Zamberlam, Santos & Gomes, 2016).

Given the above, countries are taking actions with the objective of adequately managing the volume of waste generated in civil construction, primarily aimed at minimizing the

environmental impact caused by the activity (Yeheyis et al. 2013). In Brazil, the main legislation around the management of civil construction waste is CONAMA Resolution 307, instituted on July 5th, 2002, which came into force in January 2003, establishing guidelines for the correct management of the waste generated (CONAMA, 2002).

In view of the existence of the above-mentioned legislation, it was found that the main control and inspection tool established in the Law is the elaboration of waste management plans, delegated to Brazilian municipalities. In this sense, the plans should include all the aspects required under the regulations.

Thus, with the development of this research, an answer for the following question was sought: What are the main characteristics of the Brazilian publications about the civil construction waste management plan published between 2003 and 2016?

Therefore, this study aims to present a systematic review of Brazilian scientific productions about the civil construction waste management plan published between 2003 and 2016. The studies were selected from 2003 onwards due to the fact that legislation no. 307/2002 came into force that year. This research aims to contribute to the dissemination of the theme linked to the civil construction waste management plan in Brazil. This theme is still relatively new in Brazilian scientific research, since the first legislation on the subject, as it has already been said, came into force in January 2003, until then, there was no specific legislation that included the management of waste in civil construction (CONAMA, 2002).

This work is structured in five sections, this first one relating to the introduction; the second contemplates a brief review of the literature; the third reports the methodological procedures adopted in the development of the research; The fourth section shows the analysis and discussion of the results, and; the last one, presents the final considerations.

2 MANAGEMENT OF CIVIL CONSTRUCTION WASTE

According to Paschoalin Filho, Storopoli, Dias and Duarte (2015) and Silva and Fernandes (2012), the civil construction segment is responsible for around 40% to 60% of the world's solid urban waste. This waste is mostly composed of mortar, concrete, ceramics, gypsum, wood, metals, cardboard and stone papers (Paschoalin Filho & Graudenz, 2012; Ann, Poon, Wong, Yip & Jaillon, 2013; Paschoalin Filho et al., 2015).

Civil construction waste is defined in accordance with CONAMA (2002) as leftovers from construction, renovation, repair, demolition and excavation of land, such as: bricks, concrete, metals, rocks, plaster, wood, linings, mortar and other materials not used in construction work in the civil construction segment.

Most of the waste from the Brazilian civil construction segment comes primarily from waste that occurs at construction sites, either in the conception or execution phase. This waste can be divided into two groups: the first characterized by rubble, whose disposal occurs mostly by specialized companies; and the second, which is incorporated into buildings, due to incorrect handling of materials, poorly qualified labor and use of inadequate equipment (Linhares, Ferreira & Ritter, 2007; Yeheyis et al., 2013; Yuan, 2013; Paschoalin Filho et al., 2015).

In view of these data, the Government plays a fundamental role in the inclusion of public policies aimed at the correct management of waste. In Brazil, this function is the responsibility of CONAMA. In this sense, the management of civil construction waste in Brazil based on resolution no. 307 of 2002, instituted by CONAMA, makes each municipality responsible for the correct management of waste and the institution of their respective management plans, which does not have a standard model before the National Government (Guerreiro et al., 2013). The resolution emerged with the intention of establishing guidelines for the correct management of waste. According to its Article 2, the term waste management is defined as ‘the management

system that aims to reduce, reuse or recycle waste, including planning, responsibilities, practices, procedures and resources to develop and implement the necessary actions to comply with the steps provided for in programs and plans.'

Among the main requirements of the 'resolution,' this also determines, in its Article 5, the implementation of the Civil Construction Waste Management Plan granted to the municipalities and the Federal District, which should include the Municipal Program for Management of Civil Construction Waste, as well as Projects for Management of Civil Construction Waste. At this point, it is up to the municipality to elaborate all the technical guidelines involved in waste management, the responsibilities of all individuals or legal entities involved in the process, as well as to monitor whether the resolution has been complied with. In the waste management process, all stages of the Waste Management Project must be included, being: characterization, sorting, conditioning, transportation, and destination (CONAMA, 2002).

As for characterization, in addition to the promotion of waste mitigation and reuse practices, the regulations also classify construction and demolition waste in a more homogeneous manner, since they have different characteristics and their destination varies according to these characteristics. Segregating waste into classes ensures more efficiency in the process of disposal, whether through recycling, reuse or final disposal (Linhares, Ferreira & Ritter, 2007). According to CONAMA Resolution no. 307 of 2002, waste should be subdivided into four classes, as shown in Figure 1.

Class	Definition	Example	Destination
Class A	Reusable or recyclable waste	- Waste from infrastructure works - Recyclable waste, such as: metals, glass, cardboard, etc. - Waste from the manufacturing process and/or demolition of precast concrete parts	They must be reused or recycled as aggregates, or sent to landfill sites for civil construction waste, and must be disposed of in such a way that they can be used or recycled in the future.
Class B	Recyclable waste for other purposes.	Plastics, paper, cardboard, metals, glass, wood, empty packaging of real estate paints (whose container has only dry film of ink in its internal coating,).	They must be reused, recycled or sent to temporary storage sites and must be disposed in such a way that they can be used or recycled in the future.
Class C	Waste for which no economically viable technologies or applications have been developed to enable its recycling.	Gypsum waste.	They must be stored, transported and destined in accordance with the specific technical standards.
Class D	Hazardous waste from the construction process.	Waste such as: paints, solvents, oils and others, or those contaminated from demolitions, refurbishments and repairs of radiology clinics, industrial facilities, etc.	They must be stored, transported, reused and disposed of in accordance with specific technical standards.

Figure 1: Classification of Civil Construction Waste
Source: CONAMA (2002) and CONAMA (2015).

This type of classification is used for the correct handling and disposal of waste. Classes A and B must be sent primarily for recycling or being reusable, Class C, composed of gypsum waste, are not subject to recycling, so they must be disposed of by specialized companies, and Class D, which are classified as hazardous, must have their final destination performed by companies specialized in the correct disposal of this kind of waste.

In this sense, for the purpose of control, the municipalities delegate this responsibility to the waste generators, who prepare their respective plans. With regard to waste generators, the resolution defines them as individuals or legal entities, public or private, that generate some volume of waste in works carried out. They are responsible for the elaboration of the Civil Construction Waste Management Plan (CCWMP), which, in accordance with Article 9 of the resolution, must include the following stages:

> I - Characterization: at this stage the generator must identify and quantify the waste
> II - Sorting: it should preferably be carried out by the generator at the origin, or be carried out in the destination areas licensed for this purpose, respecting the classes of waste established in Article 3 of this Resolution;
> III - Conditioning: the generator must guarantee the isolation of the residues after their generation until the transport stage, assuring in all the cases where it is possible, the reuse and recycling conditions;
> IV - Transportation: must be carried out in accordance with the previous stages and in accordance with the technical standards in force for the transportation of waste;
> V - Destination: must be in accordance with what is established in this Resolution (CONAMA, p. 01, 2002).

Those who generate these residues are responsible for sorting, conditioning and sending the waste to the companies responsible for its transportation, according to their respective classes, as well as quantifying the volume of waste generated, to later allocate them to companies qualified to perform their transportation. The companies that can carry out the transportation of this waste, called transporters, must have registration with the City Hall of the Municipality and must dispose of the waste with the companies responsible for its final disposal, which must also be licensed with the municipal power, ensuring compliance with the classification requirements described by CONAMA.

In this context, it is important to point out that the main problem linked to urban waste in Brazil is related to its improper disposal, which often occurs on vacant lots, river banks, public roads, among others. This causes major public health and environmental problems, in addition to the high costs of municipalities with urban cleaning systems. Thus, this was a point of concern for CONAMA when preparing the resolution also addressing the disposal of waste (Ladeira, Rodas & Trigueiros, 2014).

The Civil Construction Waste Management Plan is the Government's main control tool in relation to the adjustments proposed by law. Once the importance of the elaboration of the Civil Construction Waste Management Plans is verified, this research intends to verify how this theme has been addressed in the scientific researches. The way in which the research was conducted is presented in the next section.

3 METHODOLOGICAL PROCEDURES

About the research objectives, it is characterized as exploratory (Gil, 2002), since through this, it was sought to become familiar with a little studied theme. Regarding the

procedures adopted, the research is defined as bibliographic and documentary (Fachin, 2001), because the data collection was performed through published documents. The research is also characterized as a systematic literature review, in which the investigation of evidence was conducted on a central theme (Brereton, Kitchenham, Budgen, Turner and Khalil, 2007; Pigosso, 2007).

The studies that composed the research were selected from the databases of national journals in the area of Administration, Accounting and Tourism, evaluated through the Qualis system of the Coordination for the Improvement of Higher-Level Personnel (CAPES), with classification in strata from A1 to C in October and November 2016. A selection of journals was made with emphasis on the subareas of Administration, Sustainability, Civil Engineering and Urban Planning, which were identified by reading the scope of the journals. This information was obtained from the electronic pages of each of the journals and resulted in a total of 162 journals.

The research in the 162 journals was conducted through the search tools of each one, using a set of keywords, which were: 'waste management plan + civil construction;' 'PGRCC;' 'plan + civil construction' and 'waste + civil construction.' A total of 272 selected results were obtained in 29 journals, which are described in Table 1, along with the respective classification in the strata of the Qualis system of Capes disclosed by its last evaluation (2015).

Table 1: Selected journals

Title	Stratum
Cadernos EBAPE.BR (FGV)	A2
Organizações & Sociedade (Online)	A2
Ambiente Construído (Online)	B2
Desenvolvimento em Questão	B2
RAI: Revista de Administração e Inovação	B1
Desenvolvimento e Meio ambiente (UFPR)	B3
GEPROS. Gestão da Produção, Operações e Sistemas (Online)	B3
Gestão e Planejamento	B2
Organizações em Contexto	B1
RACE - Revista de Administração, Contabilidade e Economia (Online)	B3
RACE: Revista de Administração, Contabilidade e Economia	B3
RGSA: Revista de Gestão Social e Ambiental	B1
Revista Ibero-Americana de Ciências Ambientais	B4
Revista Organizações em Contexto (Online)	B1
Revista Paranaense de Desenvolvimento	B4
Revista da Universidade Vale do Rio Verde	B3
Revista de Negócios (Online)	B2
Cadernos Gestão Social	B5
Educação Ambiental em Ação	B4
Em Questão	B3
Navus Revista de Gestão e Tecnologia	B3
RCA. Revista de Ciências Ambientais (UniLASALLE)	B4
REBAP. Revista Brasileira de Administração Política	B4
Revista Brasileira de Educação Ambiental (Online)	B4
Revista Gestão & Sustentabilidade Ambiental	B4
Revista Meio Ambiente e Sustentabilidade	B4

Revista Monografias Ambientais	B3
Revista Produção Online	B3
Revista de Administração da FATEA	B3

Source: Research data (2016).

The 272 articles were selected by reading their titles and abstracts in order to identify the studies that included the waste management plan in civil construction. The exclusion criteria of the articles included: studies that addressed only the waste without relating to the management plan, and studies that addressed the management of waste from areas other than civil construction.

After reading the abstracts of the 272 articles, 32 studies were selected which, according to their abstracts, showed the characteristics consistent with the research objective. Subsequently, these 32 studies were read and the articles that specifically addressed the civil construction waste management plan, the focus of this research, were identified. The result was 18 articles, which made up the sample of this research, and they are shown in Table 2.

Table 2: Selected articles

Article	Article title	Authors	Year	Journal
E1	Quantification and classification of construction waste from civil construction and demolition in the city of Pelotas- RS	Tessaro, de Sá & Scremin	2012	Ambiente Construído
E2	Regulatory aspects regarding civil construction waste: an exploratory research of the situation in Brazil and Portugal	Paschoalin Filho, Dias & Cortes	2014	Desenvolvimento e Meio ambiente
E3	Solid waste management and reverse logistics: a case study in a construction sector organization	Ladeira, Rodas & Trigueiros	2014	Gestão e Planejamento
E4	Environmental management policies and practices: an analysis of civil construction waste management in the city of Belo Horizonte-MG	Silva, Brito, Pereira, & Amâncio	2006	Cadernos EBAPE.BR (FGV)
E5	Differentiated waste management and recycling program of the city of Belo Horizonte-MG	Morais & Pereira	2012	Revista de Gestão Social e Ambiental
E6	Recycling of construction and demolition waste (RCDW): a case study at the Petrolina-PE waste processing plant	Vasconcelos, Santos, Santos Junior & silva	2016	Revista de Gestão Social e Ambiental
E7	Management of demolition waste generated in the construction of a building located in the east zone of the city of São Paulo-SP.	Paschoalin Filho, Storopoli, Dias & Duarte	2015	Desenvolvimento em Questão
E8	Environmental impacts caused by civil construction waste in Imperatriz-Maranhão	Lima & Almeida	2015	Educação Ambiental em ação
E9	Environmental education and management of solid waste from construction and demolition in the municipality of Canoas-RS	Jardim & Fofonka	2013	Educação Ambiental em ação
E10	Management of solid waste in civil construction: an analysis of the GRI report of companies listed on BM&FBOVESPA	Souza, Batista Junior, Ferreira & Ferreira	2015	Navus Revista de Gestão e Tecnologia

E11	Contributions of 'cleaner production' to the management of solid waste from the productive activities of civil construction	Farias, Medeiros & Freitas	2015	Revista Gestão & Sustentabilidade Ambiental
E12	Characterization and destination of construction waste generated during the construction of a commercial building located in the city of São Paulo-SP.	Paschoalin Filho & Duarte	2014	Revista Gestão & Sustentabilidade Ambiental
E13	Evaluation of the civil construction and demolition waste management program in the municipality of Caçapava – SP.	Moraes & Henkes	2013	Revista Gestão & Sustentabilidade Ambiental
E14	The management of solid waste from civil construction and demolition in the municipality of Belo Horizonte-MG.	Ramos, Pinto & Melo	2013	Revista Gestão & Sustentabilidade Ambiental
E15	Overview of civil construction waste management in a sample of municipalities in the state of Rio Grande do Sul - RS.	Schiavi & Lipp-Nissinen	2014	Revista Monografias Ambientais
E16	Environmental education and civil construction: waste management practices in Foz do Iguaçu-PR.	Frigo & Silveira	2012	Revista Monografias Ambientais
E17	Unconsciousness of the builders regarding the environmental management at the construction site: a case study in the southern region of João Pessoa/PB.	Santos	2012	Revista Monografias Ambientais
E18	Diagnosis of civil construction waste generation: a case study of construction sites in the city of Pau dos Ferros-RN.	Barbosa, Oliveira & Oliveira	2016	Revista Monografias Ambientais

Source: Research data (2016).

The 18 studies were analyzed summarizing the following information: year of publication, authors, number of authors per study, origin of authors, volume of article per journal and keywords of the articles. It was also inferred regarding the methods, results and themes addressed in the studies. The results obtained are showed in the following topic.

4 ANALYSIS AND DISCUSSION OF THE RESULTS

In this item, the analysis and discussion of the 18 studies that support the research is presented. This study was based on publications in the area of Administration, Accounting and Tourism made available on the Capes Sucupira Platform from 2003 to 2016, and the distribution of the number of articles published each year is shown in Table 3.

Table 3: Distribution of articles by year of publication

2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
0	0	0	1	0	0	0	0	0	4	2	4	5	2

Source: Research data (2016).

As shown, there was one publication in the years 2003 to 2006, no publication between the years 2007 to 2011, and between the years 2012 and 2016 between 2 and 5 articles were

published. The year of greatest publications was 2015, with five articles that somehow addressed the civil construction waste management plan. These oscillations are shown in Figure 2.

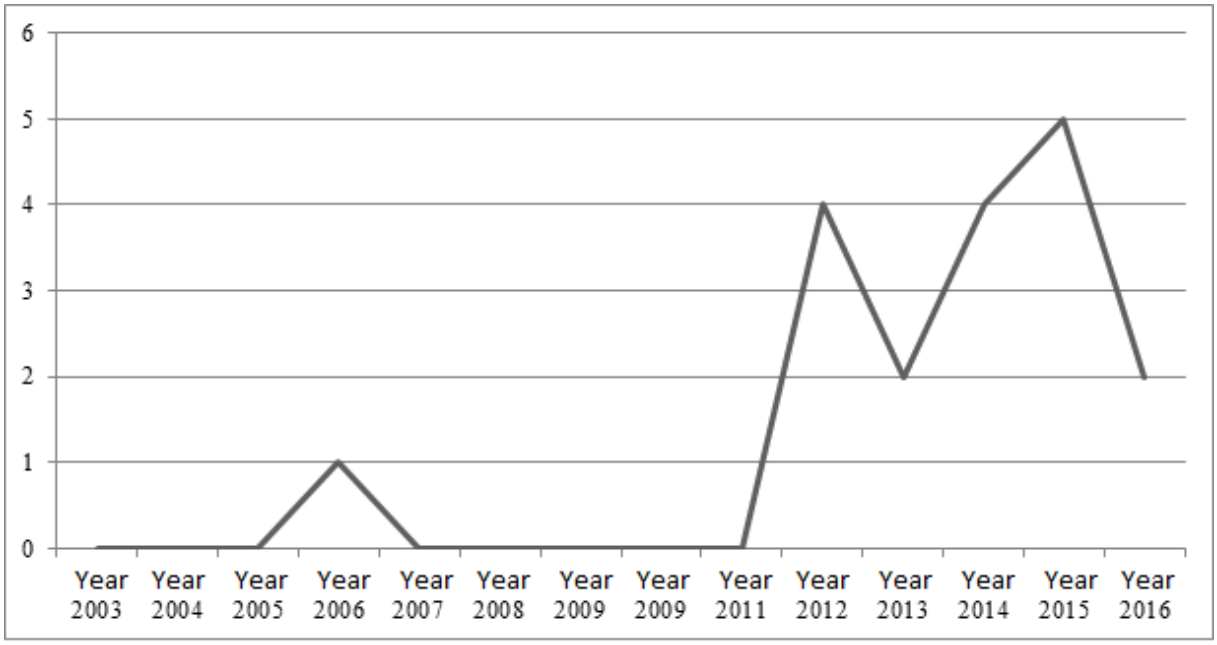

Figure 2: Articles by year of publication
Source: Research data (2016).

In the year 2003, in which the regulation came into force, there was no publication (Figure 2), which also occurred in the following year and remained almost unchanged until the 2011, except for the publication in 2006. It is important to point out that in this publication the authors showed the civil construction waste management practices implemented by the public authorities of the city of Belo Horizonte, and at no point in the study was CONAMA regulation 307/2002 cited. The study showed the public authorities as a proactive actor in the planning and execution of actions in favor of the effectiveness of the waste management plan, due to a requirement observed in the local community.

This fact allows inferring that even with the enactment of the regulation that is the main reference regarding the Brazilian civil construction waste management plan, the studies still did not link the management of waste to it. This occurs only in 2012, which showed four studies, three of which addressed the regulation of CONAMA No. 307/2002. The study, which did not mention the legislation, was developed by Frigo and Silveira (2002), and it was based on the environmental education of the community, with regard to the waste management plan promoted in the city of Foz do Iguaçu-PR.

When analyzing the period from 2013 to 2016, it was observed that all published studies addressed the legislation of CONAMA no. 307/2002 in their analysis and discussion of results or as a theoretical basis, which denotes the importance of the legislation referred to in the studies that composed the sample of this research. As well as, it was possible to verify that the publications related to the regulation have increased since its promulgation in 2002.

The following analysis was based on the research of the main authors of the studies selected in this research (Table 4). In this sense, the author who published the most in the analyzed period was João Alexandre Paschoalin Filho (three publications), the author António José Guerner Dias (two publications), and Eric Brum de Lima Duarte (two publications). The other authors scored only one publication each. It should be noted that the three authors who most published, conducted their studies together, and among the three publications of João

Alexandre Paschoalin Filho, one was in co-authorship with António José Guerner Dias and the other was in co-authorship with Eric Brum de Lima Duarte. The third publication of João Alexandre was also in co-authorship with the two researchers already mentioned.

Table 4: Main authors of the selected publications

Author	Number of publications
João Alexandre Paschoalin Filho	3
António José Guerner Dias	2
Eric Brum de Lima Duarte	2
Other authors	1

Source: Research data (2016).

Among the three authors, it was found that João Alexandre Paschoalin Filho is a lecturer in the postgraduate Professional Master Business Administration program of the Universidade Nove de Julho (Uninove), in which he was a professor and guided the dissertation of Eric Brum de Lima Duarte in 2014. And António José Guerner Dias is an integral researcher of some of the research projects that João Alexandre Paschoalin Filho develops at Uninove. The author António José Guerner Dias is a professor at the University of Porto in Portugal, which Uninove has a partnership for exchange and development of projects focused on environmental management and sustainability. Thus, this information shows that the authors, who have most published on the theme linked to the civil construction waste management plan, are linked to the graduate program in Administration of the Universidade Nove de Julho.

Regarding the origin of the authors, the institution of their last training was considered, the information was collected through consultation on the Lattes platform of the National Council for Scientific and Technological Development (CNPQ), in November 2016. The results are shown in Figure 3.

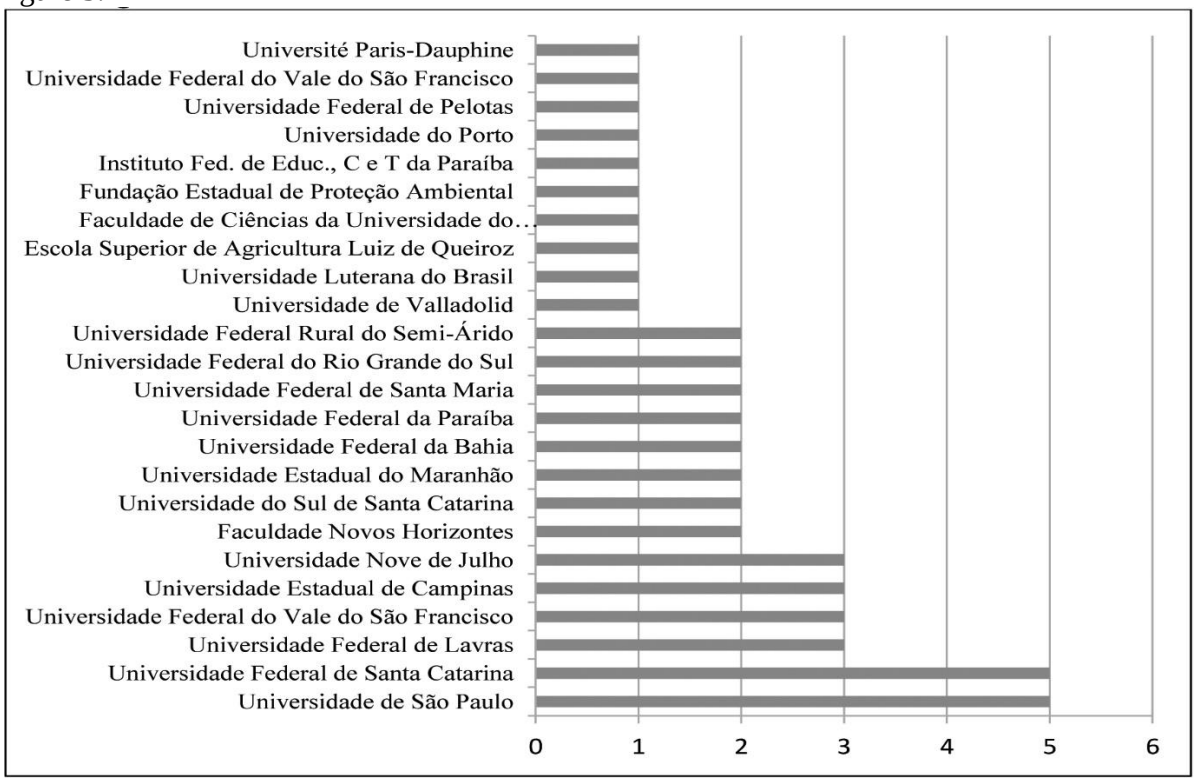

Figure 3: Origin of the authors' university
Source: Research data (2016).

As visualized in Figure 3, most authors have as their last education the course held at the Federal University of Santa Catarina or University of São Paulo, each with five authors. Four authors have their last education at the Federal University of Lavras, Federal University of Vale do São Francisco, State University of Campinas and Nove de Julho University. Among the latter are the State University of Campinas and Nove de Julho University, as they are the universities of last formation of two of the three authors who most published in the theme studied, João Alexandre Paschoalin Filho, and Eric Brum de Lima Duarte, respectively.

Some of the authors are from foreign universities, such as Université Paris-Dauphine and the University of Valhadolide and the Faculty of Sciences of the University of Porto/Portugal, the latter is the university of last formation of António José Guerner Dias, one of the authors who most addressed the civil construction waste management plan. The other universities showed from one to two authors.

The number of authors per study was also verified, in which the highest percentage was observed with two authors (38.9%) followed by three authors (33.3%), four authors (22.2%) and only one study with one author (5.6%), as shown in Table 5, which reveals a tendency that the development of these studies is with more than one researcher.

Table 5: Number of authors per study

Number of Authors	Studies	Percentage
4	4	22.2%
3	6	33.3%
2	7	38.9%
1	1	5.6%
Total	18	100%

Source: Research data (2016).

Table 6 shows the list of articles per journal, in which most of the studies were published in areas involving sustainability, while the others focused on civil construction, urban planning, administration and technology. The results show that, based on the approach of each journal, waste management is mostly linked to environmental management and sustainability.

Table 6: Magazines of selected publications

Magazine	Number of studies	Classification in the Qualis system of Capes
Revista Gestão & Sustentabilidade Ambiental	4	B4
Revista Monografias Ambientais	4	B3
Revista de Gestão Social e Ambiental	2	B1
Educação Ambiental em ação	2	B4
Ambiente Construído	1	B2
Desenvolvimento e Meio ambiente	1	B3
Gestão e Planejamento	1	B2
Cadernos EBAPE.BR (FGV)	1	A2
Desenvolvimento em Questão	1	B2
Navus Revista de Gestão e Tecnologia	1	B3

Source: Research data (2016).

The list of the studies with the theme involved in sustainability occurs mainly due to the harmful impacts, direct or indirect, that the inadequate management of construction waste causes to the environment (Yeheyis et al. 2013; Brasileiro & Matos, 2015; Macêdo & Martins, 2015; Teixeira et al., 2016).

The classification of the journals in the Qualis system of Capes of the selected articles was also verified. The largest number of articles was concentrated in strata B3 and B4, each with six studies, followed by B2, B1 and A2, with 3.2 and 1, respectively.

The following analysis was based on the quotes of the 18 articles in the Google Scholar database with period referring to the month of December 2016. The results are shown in Figure 4.

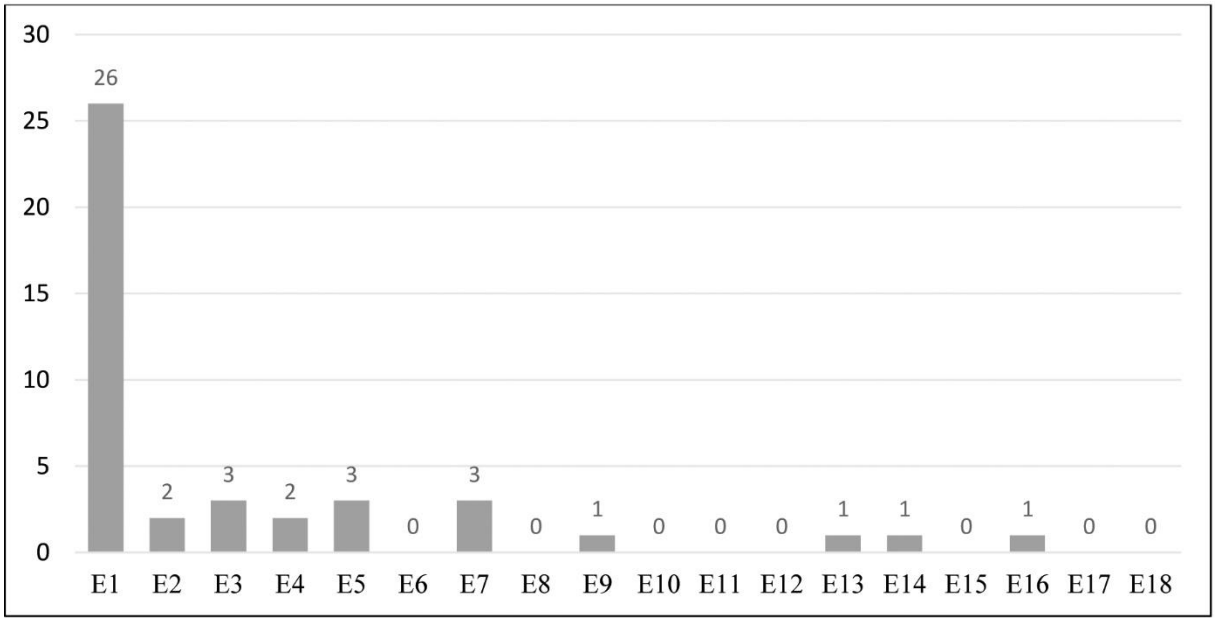

Figure 4: Quotes from publications
Source: Google Scholar (2016).

As shown in Figure 4, E1 was the study with the most quotes, totaling 26, studies E3, E5 and E7 showed three quotes. And studies E2 and E4 two, the others one or no quote. The Google Scholar was the base choice because not all journals are indexed in other databases.

The verification of the methods used in the studies was also performed, and it was subdivided into approach to the problem, classification as to objectives and methodological procedures and the methods of data collection used. As shown in Figure 5.

Article	**Issue approach**	**Classification of the study (objectives)**	**Classification of the study (methodological procedures)**	**Data collection methods**
E1	Qualitative and Quantitative	Descriptive exploratory	Case study	Interview and quantification of the volume of waste by means of software
E2	Qualitative	Descriptive	Documentary research	Documentary analysis
E3	Qualitative	Descriptive	Case study	Semi-structured interview and observation

E4	Qualitative	Descriptive	Case study	Documentary analysis, observation and interviews
E5	Qualitative	Descriptive	Case study	Documentary analysis
E6	Qualitative	Explanatory description	Case study	Documentary analysis, observation and interview
E7	Qualitative	Descriptive exploratory	Case study	Documentary analysis, observation and interview
E8	Qualitative	Descriptive	Multi-Case study	Documentary analysis
E9	Qualitative and Quantitative	Descriptive	Case study	Documentary and data analysis of the volume of waste generated
E10	Qualitative	Descriptive	Case study	Documentary analysis
E11	Qualitative	Descriptive	Case study	Cleaner production (CP) model
E12	Qualitative	Descriptive	Case study	Observation
E13	Qualitative	Descriptive	Case study	Interview, observation and documentary analysis
E14	Qualitative	Descriptive	Case study	Interview and observation
E15	Qualitative	Descriptive	Case study	Questionnaire
E16	Qualitative	Explanatory exploration	Case study	Observation, Interview and Documentary Analysis
E17	Qualitative	Descriptive	Case study	Interview
E18	Qualitative	Descriptive	Case study	Observation, Questionnaires and photographic record

Figure 5: Methods used in studies
Source: Research data (2016).

Regarding the method of approaching the problem, most of the studies were qualitative in nature and only two used the mixed method, qualitative and quantitative. Given the reality addressed in the studies, the qualitative approach allows a more in-depth analysis of the phenomenon investigated, since the studies were centered on specific realities of regions or companies.

It was also found that most of the studies had a descriptive approach and were characterized as case studies. Among the data collection methods, interview, observation, questionnaires and documentary analysis were identified, which are techniques commonly used in this type of study. It is observed that the preference for preparing a case study occurs due to researches are still in the exploration and improvement phase of the concepts. This highlights the lack of maturity in the theme studied.

With respect to the contents addressed in the selected studies, the general objective, the main theoretical concepts addressed, and their main results and conclusions were verified. As shown in Figure 6.

Article	Study objective	Main theoretical concepts covered	Main findings and conclusions
E1	Show the results of the qualitative and quantitative diagnosis of the construction and demolition waste production. (CDWP) in the municipality of Pelotas-RS, prepared with the aid of software.	CONAMA Resolution no. 307 of July 5, 2002; Recycling; The use of software to support waste management.	The main results demonstrated the importance of quantifying residues, and which alternatives can be used for such action.
E2	Provide a comparative study between the normative aspects and legislation governing the generation, management and management of civil construction waste in Brazil and Portugal, in order to find common ground between both nations.	Legislation in force in each country.	The importance of the activity for both countries and its harmful impacts is highlighted. It is emphasized that Governments take actions through legislation to mitigate these impacts.
E3	Understand how a construction company manages solid waste at the Port of Salvador Access Roads project, as well as how reverse logistics is perceived by employees and whether it is employed in the project.	Sustainable Construction; Reverse Logistics; CONAMA Resolution 307 of July 5, 2002.	Importance of reverse logistics and its effectiveness in the construction company that supported the case study. The same contributed to the sustainable management of works.
E4	Study the civil construction management practices implemented by the Belo Horizonte government.	Public policies and environmental management in civil construction; CONAMA Resolution 307 of July 5, 2002.	The formulation and implementation of public environmental policies come from public and private actors who influence environmental awareness. And the implementation of policies provides economic, social and environmental benefits.
E5	Show the implementation of the Program for the Correction of Deposits and Recycling of Civil Construction Waste in Belo Horizonte-MG.	Recycling; CONAMA Resolution No. 307 of July 5, 2002.	There is an integrated and efficient waste management plan for Belo Horizonte.
E6	Identify the potentialities and weaknesses of the recycling process of construction and demolition waste from a waste processing plant and propose improvements for its management.	Recycling; CONAMA Resolution No. 307 of July 5, 2002.	The main weaknesses were observed in the collection and transportation of waste and the impacts they cause on the environment. And the potentialities identified are related to the processing capacity of waste from the processing plant, which holds up to 2,600 tons.
E7	It provides the economic viability of the reuse of demolition waste in the construction of the underground of a building located in the eastern zone of the city of São Paulo.	Waste Management in Brazil; Recycling; CONAMA Resolution 307 of July 5, 2002.	The study detected the advantages of reusing the waste in the same construction works where it is generated. In this way, the economic feasibility of reuse was proven.
E8	Show the importance of the civil construction waste management and investigate the possible use of a management plan by entrepreneurs in the city of Imperatriz - MA.	Impacts arising from civil construction harmful to the environment; CONAMA Resolution No. 307 of July 5, 2002.	The results of the research demonstrated the non-compliance with the Resolution CONAMA nº 307/2002, by some companies for not providing the requirements addressed in the resolution on the

			civil construction waste management.
E9	Shows a partial diagnosis of solid waste management from civil construction in the Municipality of Canoas/RS.	Law no. 12.305/10; CONAMA Resolution no. 307 of July 5, 2002; Environmental education.	The legislation pertinent to waste management is enough, but in this municipality, it is not applied in an efficient manner, because of the lack of supervision, the construction companies do not follow the legislation.
E10	Identify and evaluate what the civil construction companies, listed on BM&FBOVESPA, evidence in their sustainability reports regarding the management of their waste.	Waste generated in civil construction; CONAMA Resolution 307 of July 5, 2002.	Few companies in this field listed on BM&FBOVESPA publish general sustainability reports.
E11	Analyze how the 'cleaner production' principles can be incorporated into the construction stages of a 'green' construction project.	Cleaner Production Model; CONAMA Resolution No. 307 of July 5, 2002.	The cleaner production tool is not applied efficiently. The first steps are applied to the correct concern and separation of waste; however, the recycling principles, which are essential in the tool, are not applied.
E12	Provide the characterization of the residues discarded during the construction of a commercial building located in the city of São Paulo and the forms used for their correct disposal.	Waste management in Brazil; CONAMA Resolution 307 of July 5, 2002.	The residues were identified, and alternatives were proposed for their disposal in accordance with the current legislation.
E13	Identify the management situation of the civil construction and demolition waste management programs in the municipality of Caçapava-SP.	Impacts of the activity on the environment; Management of civil construction waste; CONAMA Resolution 307 of July 5, 2002.	The results highlighted the role of the State in the establishment and supervision of laws on waste management and alternatives for construction companies.
E14	Identify and analyze the policy and means of control used by the Belo Horizonte public authorities for the reception and disposal of solid construction and demolition waste (CDW).	Impacts of the activity on the environment; Civil construction waste management; Disposal of waste; Resolution of CONAMA No. 307 of July 5, 2002.	There is a policy in force in Belo Horizonte to support the civil construction waste management, which includes national regulatory aspects. The processes are efficient; however, there are no actions to reduce the volume of waste generated.
E15	Raise the panorama of civil construction waste management in municipalities of the State of Rio Grande do Sul - RS	Municipal responsibility in relation to waste management; CONAMA Resolution 307 of July 5, 2002.	Most municipalities have their civil construction waste management plans, but do not carry out recycling or awareness raising activities for residents.
E16	Promote the awareness of professionals and population in general about the importance of environmental education about the waste generated by civil construction through a technical brochure.	Impacts of the activity on the environment; Civil construction waste management.	A mapping of the disposal points for civil construction waste was carried out and an explanatory leaflet was prepared, addressing how the correct management of the waste should be carried out and where it should be disposed of.
E17	Analyze the environmental awareness of construction company administrators in João Pessoa-PB.	Current legislation linked to the theme. CONAMA Resolution no. 307 of July 5, 2002.	Most administrators do not have environmental awareness, which is justified by the low knowledge about the legislation regarding the civil construction waste management.

E18	Provide a diagnosis of the generation of civil construction waste (CCW) at the construction sites in the city of Pau dos Ferros/RN.	Impacts of the activity on the environment; CONAMA Resolution 307 of July 5, 2002.	The construction companies know the legislation on waste management; however, there is little application of sanctions regarding them, it is suggested that municipal public policies be strengthened.

Figure 6: Analysis of the content addressed in the studies
Source: Research data (2016).

With regard to the objectives of the studies researched, it was found that because most of them were case studies, the reality of a company or a location was restricted. In this way, the objectives addressed diagnoses and analyses focused on waste, the education of people involved with the activity and the relevant legislation.

In relation to the topics addressed in the studies, all of them were focused on environmental management and sustainability. This is due to the intensification of research aimed at the harmful impacts of productive activities on the environment, where interest groups demand from companies an attitude consistent with the preservation of environmental resources (Yeheyis, Hewage, Alam, Eskicioglu & Sadiq, 2013; Macêdo & Martins, 2015; Teixeira et al., 2016).

Due to the studies are focused on the area of civil construction, the harmful impacts on the environment were highlighted, in addition to alternatives to mitigate them. It was found that 16, out of the 18 studies approached, had the analysis of waste management based on CONAMA resolution 307 of July 5, 2002, which came into force in 2003, and established that it would be up to the municipalities to prepare their waste management plans, with a maximum term of up to twelve months after the resolution was published (CONAMA, 2002).

Even after the resolution came into force, in most of the selected studies, dated more than 2006, there were few municipalities that officially had the civil construction waste management plan in place. Some of the studies even carried out some suggestions for the implementation of the plan, based on the results obtained from their respective researches.

Among the studies that reported the implementation of plans by the municipality, represented by studies E1, E4, E5, E9 and E14, it was found that the municipality of Belo Horizonte stood out, since it was cited in three studies, for having a policy to support the civil construction waste management operating in an integrated manner, according to the requirements of CONAMA 307/2002. The only deficiency of the municipality, identified in the studies, is related to the fact that it does not carry out actions in favor of the mitigation of waste generated.

Other municipalities that were cited as acting in relation to the CCWMP were Pelotas-RS, which already have the integrated management plan for civil construction waste. However, it has not yet managed to make the population aware of the reduction, reuse and recycling of waste. There was also a study conducted in the municipality of Canoas/RS, which also has the plan, but does not operate efficiently, since there is no monitoring of compliance with the resolution.

In this sense, according to Yeheyis et al., (2013), and Paschoalin Filho et al., (2015), the high volume of waste from civil construction occurs primarily due to the waste that occurred in construction sites, mainly from natural materials such as sand, stones, cement, concrete, wood, among others. Conama Resolution 307/2002 also recommends that the initial actions of municipalities should be focused on reducing the volume generated, and other actions, whether reuse, recycling or final disposal, should be carried out, only in cases where the reduction is not possible.

Through the analysis of the studies, it was possible to verify, as already mentioned, that the main problem related to waste from civil construction is related to the volume generated,

which occurs due to the high waste in the construction sites. Thus, the actions of the construction companies should be focused on the education of their employees regarding the correct management of equipment and materials, and in relation to the Municipality to strengthen this position of the construction companies, through the legal requirements (Linhares, Ferreira & Ritter, 2007; Guerreiro, Maas & Hogland, 2013). In this sense, Guerreiro, Maas & Hogland (2013) commented that it is necessary to mitigate as much as possible the volume of waste, and in cases where this is not possible, the reuse or recycling of waste should be chosen, keeping the final disposal as the last alternative.

The studies were grouped according to the main theoretical approaches addressed and results obtained in relation to the civil construction waste management plan, as shown in Figure 7.

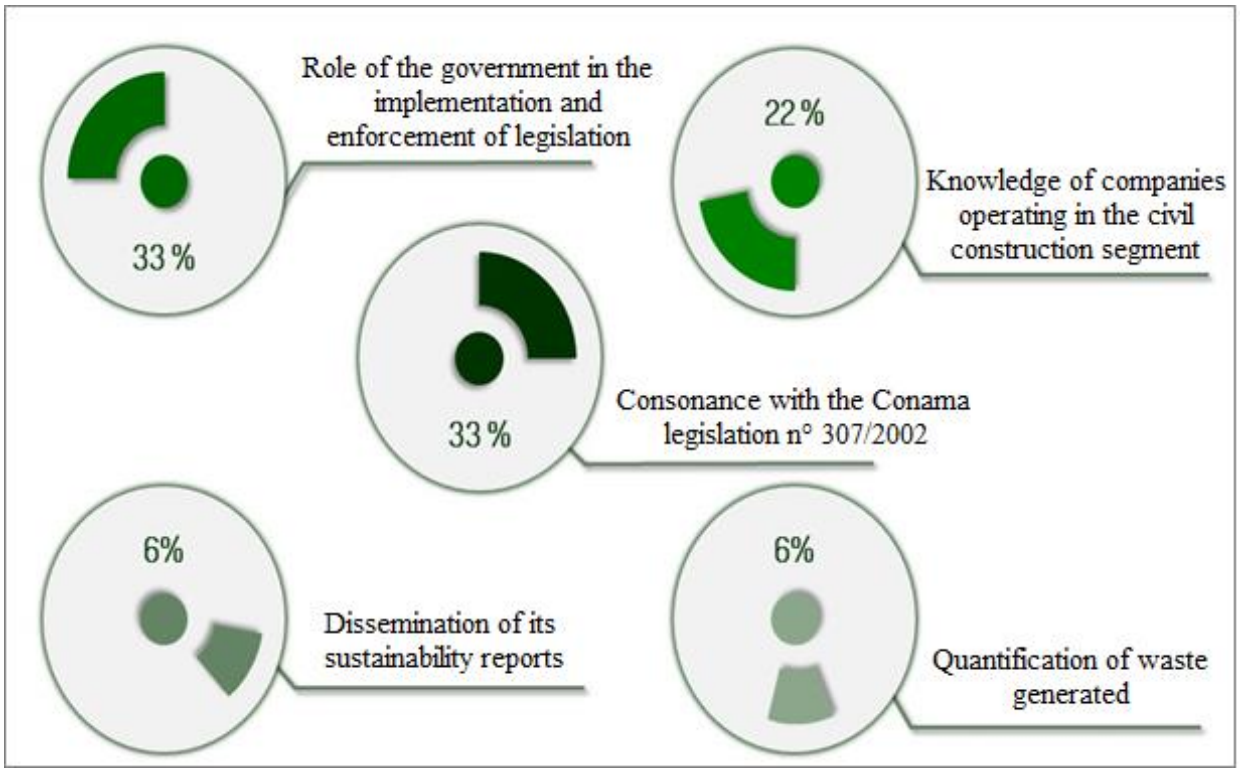

Figure 7: Groupings of theoretical approaches addressed in the studies
Source: Prepared by the authors (2016).

The studies that addressed the role of the Government in the implementation and enforcement of legislation related to waste management were: E2; E4; E9; E13; E14 and E15. They emphasized the importance of the role of governments in the civil construction waste management through the implementation of legislation or public policies on waste control and its inspection.

Some studies proposed solutions to facilitate waste management in accordance with CONAMA legislation 307 of July 5, 2002, studies: E3; E5; E6; E7; E11 and E12. Among the proposed alternatives are reverse logistics, more efficient collection and transportation of waste, recycling, reuse and the cleaner production model.

Four studies addressed the knowledge of companies active in the civil construction segment: E8; E16; E17 and E18. These included technical capacity, knowledge of the legislation and environmental awareness of the companies and their managers in relation to the correct management of the waste generated.

Study E1 highlighted the importance of quantifying the waste generated, which facilitates its control. According to Tessaro, de Sá & Scremin (2012), the mitigation or correct management of waste should start from the volume generated, the correct management will be possible, only if the companies responsible for the works have the knowledge of the volume generated. Thus, the initial step for the correct management of waste, whether in civil construction or any other areas, is to identify how much waste is generated.

In addition, one of the studies, E10, which assessed whether companies, listed on BM&FBOVESPA, in the civil construction sector disclosed their sustainability reports, in which the authors concluded that even among the companies that have actions in favor of sustainability, few disclose this type of information.

According to the studies mentioned above, there is little research on the civil construction waste management plan, and those selected show that the theme is still not widespread. This fact is justified because it is a theme with recent legislation that is still being implemented, there is little knowledge of those involved with the segment and the municipalities do not require or monitor effectively the activities related to the civil construction management plan.

5 CLOSING REMARKS

The results of this research, on the Brazilian publications in the areas of Administration, Accounting and Tourism, related to the civil construction waste management plan between 2003 and 2016 showed that this subject is still poorly disseminated and approached by researchers. This was proven when performing the analysis of the methods used to prepare the studies, which were characterized by the use of research techniques of qualitative approach, such as interview, observation and documentary analysis, in addition to the classification of most of the articles in case study, which are commonly used when it is desired to know better the phenomenon studied.

Another factor that demonstrates that the studies on the civil construction waste management plan in the area of Administration, Accounting and Tourism is scarce was the quantity of studies with the necessary characteristics for inclusion in the sample intended in this research. In the initial analysis of the studies obtained in the researches with the selected keywords, many studies were identified that addressed the theme of waste, however, they did not mention the waste management plan, as well as studies of other areas, and not the civil construction, the focus of this study.

Most of the studies surveyed were focused on the area of sustainability, which occurs due to the environmental impact caused by civil construction activity, caused by the use of resources and the volume of waste generated. Legislation regarding specific waste management for civil construction has little more than a decade and many municipalities still do not have their own waste management plan model in line with the requirements of resolution 307 of July 5, 2002. It was also found that the municipalities studied in the analyzed articles are aware of the regulations, however, they have not yet met all the aspects required therein, including the preparation of the respective waste management plans. This allows us to infer that even with the deadlines for the preparation of the plans required by law, the municipalities have not yet complied with them. In addition, the Government did not carry out inspections with regard to compliance with the regulations in these states.

Initially, the characteristics of the studies were verified, such as year of publication, main authors, number of authors per article, origin university, journals with more publications, as well as the classification in the Qualis system of Capes. These analyses allowed us to infer that articles on this topic began to be published more effectively only after 2012, in which

resolution 307 of July 5, 2002 was cited as a reference regarding the correct management of civil construction waste. It was also observed that in relation to the authors of the articles, there are three main authors, all linked to Universidade Nove de Julho.

In addition to the aforementioned analysis and the methodological analysis of the articles that made up the sample of this research, the main theoretical axes addressed in the research were extracted, namely: the role of the Government in the implementation and inspection of legislation, solutions to facilitate the management of waste in accordance with CONAMA legislation No. 307 of July 5, 2002, the knowledge of companies operating in the civil construction segment, the importance of quantifying the waste generated and the dissemination of sustainability reports.

These approaches, viewed together, demonstrate the main deficiencies in the process of preparing the waste management plan in the Brazilian civil construction segment and can be considered in their aspects by two main actors: The Government and the companies active in the segment. On the one hand, there is the government's role, which is delegated to each municipality, to implement and supervise municipal policies in accordance with CONAMA legislation No. 307/2002, preparing their respective waste management plans. On the other hand, the role of the companies is verified, to organize their activities, aiming at the correct management of waste. In general, both in the governmental sphere and in that of the generators (construction companies), there is low adherence to the practice of reducing, reusing and recycling the volume of waste generated in the construction sites, which denotes the lack of maturation of actions in this sense.

The five groups obtained show a mapping of the main approaches addressed in the theme, which provide subsidies for the design of future research, either for research focused on companies operating in the civil construction segment, as well as the government role in this context. As suggestions for future work, there is the possibility of extending the theme researched to the international scope, in order to seek practices that can be implemented in Brazil. It is also suggested to expand the research related to the solid waste management plan to other areas, such as health, whose practice is already consolidated, in order to seek ways to more effectively disseminate the theme in the field studied.

REFERENCES

Ann, T. W., Poon, C. S., Wong, A., Yip, R., & Jaillon, L. (2013). Impact of Construction Waste Disposal Charging Scheme on work practices at construction sites in Hong Kong. *Waste management*, 33(1), 138-146

Brereton, P., Kitchenham, B. A., Budgen, D., Turner, M., Khalil, M. (2007). Lessons from applying the systematic literature review process within the software engineering domain. *The Journal of Systems and Software.* 80 (4), 571-583.

Brasil. Programa Minha Casa Minha Vida. (2013). Disponível em: < http://www.sedhab.df.gov.br/mapas_sicad/conferencias/programa_minha_casa_minha_vida.pdf>.

CONAMA - Conselho Nacional do Meio Ambiente. (2002). *Resolução 307, de 5 de julho de 2002*. Estabelece diretrizes, critérios e procedimentos para a gestão dos resíduos da construção civil.

CONAMA - Conselho Nacional do Meio Ambiente. (2015*). Resolução 469, de 29 de julho de 2015.* Altera a Resolução CONAMA nº 307, de 05 de julho de 2002, que estabelece diretrizes, critérios e procedimentos para a gestão dos resíduos da construção civil.

Construbusiness - 12º Congresso Brasileiro da construção. Departamento da Indústria da Construção (DECONCIC). 2016. Federação das Indústrias do Estado de São Paulo (FIESP). São Paulo-SP.

Barbosa, H. B., Oliveira, A. K., & Oliveira, L. H. (2016). Diagnóstico da geração de resíduos de construção civil: um estudo de caso de canteiros na cidade de Pau dos Ferros/RN. *Revista Monografias Ambientais, 15(1).*

Fachin, O. (2001). *Fundamentos de metodologia.* 3.ed. São Paulo: Saraiva.

Farias, A. D., Medeiros, H. R. D., & Freitas, L. S. (2015). Contribuições da cleaner production para a gestão de resíduos sólidos das atividades produtivas da construção civil. *Revista Gestão & Sustentabilidade Ambiental*, 4(1), 366-391.

Frigo, J. P., & da Silveira, D. S. (2012). Educação ambiental e construção civil: práticas de gestão de resíduos em foz do Iguaçu-PR. *Monografias Ambientais*, 9(9), 1938-1952.

Gil, A. C. (2002). *Como elaborar projetos de pesquisa*. 4. ed. São Paulo: Atlas. 175 p.

Guerrero, L. A., Maas, G., & Hogland, W. (2013). Solid waste management challenges for cities in developing countries. *Revista Waste management,* 33(1)220-232.

Jardim, V. L., & Fofonka, L. (2013). Educação ambiental e gestão dos resíduos sólidos da construção e demolição no município de Canoas/RS. *Revista Educação Ambiental em Ação,* 44.

Ladeira, R., Rodas V., L. A., & Trigueiros, R. E. (2014). Gestão dos resíduos sólidos e logística reversa: um estudo de caso em uma organização do setor de construção civil. *Gestão & Planejamento-G&P,* 15(2), 283-304.

Laurent, A., Bakas, I., Clavreul, J., Bernstad, A., Niero, M., Gentil, E., . Hauschild M. Z. & Christensen, T. H. (2014). Review of LCA studies of solid waste management systems–Part I: Lessons learned and perspectives. *Waste management,* 34(3), 573-588.

Lima, A, R, O., Almeida, J, J, S., Impactos ambientais causados pelos resíduos da construção civil em Imperatriz-Maranhão. *Educação Ambiental em ação, 52.*

Linhares, S. P., Ferreira, J. A., & Ritter, E. (2007). Avaliação da implantação da Resolução n. 307/2002 do CONAMA sobre gerenciamento dos resíduos de construção civil. *Estudos Tecnológicos em Engenharia*, 3(3), 176-194.

Macêdo, A. T., & Martins, M. D. F. (2015). A sustentabilidade urbana sob a ótica da construção civil: um estudo nas empresas construtoras de Campina Grande-PB. *Revista de Gestão Ambiental e Sustentabilidade, 4(1).*

Moraes, R. O. & Pereira, P. M. S. (2012). O programa de manejo diferenciado e reciclagem de resíduos da prefeitura de belo horizonte. *Revista de Gestão Social e Ambiental*, v. 6, n. 1, p. 117-126.

Moraes, N. C., & Henkes, J. A. (2013). Avaliação do programa de gerenciamento de resíduos da construção civil e demolição, no município de Caçapava-SP. *Revista Gestão & Sustentabilidade Ambiental*, 2(1), 113-134.

Oliveira, R. D., Pereira, S., & Maria, P. (2012). O programa de manejo diferenciado e reciclagem de resíduos da prefeitura de Belo Horizonte. *Environmental & Social Management Journal/Revista de Gestão Social e Ambiental*, 6(1), 117-126

Paschoalin Filho, j. A.; Graudenz, G. S. (2012). Destinação irregular de resíduos de construção e demolição (RCC) e seus impactos na saúde coletiva. *Revista de Gestão Social e Ambiental*, v. 6, n. 1, p. 127-142.

Paschoalin Filho, J. A., & Duarte, E. B. L. (2014). Caracterização e destinação dos resíduos de construção gerados durante a construção de um edifício comercial localizado na cidade de São Paulo. *Revista Gestão & Sustentabilidade Ambiental*, 3(2), 223-246.

Paschoalin Filho, J. A., Dias, A. J. G., & Cortes, P. L. (2014). Aspectos normativos a respeito de resíduos de construção civil: uma pesquisa exploratória da situação no Brasil e em Portugal. *Desenvolvimento e Meio ambiente*, 29(1), 155-169.

Paschoalin Filho, J. A., Storopoli, J. H., Dias, A. J. G., & Duarte, E. B L. (2015). Gerenciamento dos resíduos de demolição gerados nas obras de um edifício localizado na zona leste da cidade de São Paulo/SP. *Desenvolvimento em Questão*, 13(30), 265-305.

Ramos, M. A., dos Passos Pinto, A. C., & de Oliveira Melo, A. A. (2013). O gerenciamento dos resíduos sólidos da construção civil e de demolição no município de Belo Horizonte. *Revista Gestão & Sustentabilidade Ambiental*, 2(2), 45-68.

Santos, R. A. (2013). Inconsciência dos construtores frente à gestão ambiental no canteiro de obras: estudo de caso na região sul de João Pessoa/PB. *Revista Monografias Ambientais*, 10(10), 2278-2287.

Schiavi, C. S., & Lipp-Nissinen, K. H. (2014). Panorama da gestão de resíduos da construção civil em municípios do estado do rio grande do Sul-RS. *Revista Monografias Ambientais*, 13(4), 3491-3515.

Silva, P. J., de Brito, M. J., Pereira, M. C., & Amâncio, R. (2006). Políticas e práticas de gestão ambiental: uma análise da gestão dos resíduos da construção civil na cidade de Belo Horizonte (MG). *Cadernos EBAPE. BR*, 4(3), 1-25.

Silva, P. J. (2006). Políticas e práticas de gestão ambiental: um a análise da gestão dos resíduos da construção civil na cidade de Belo Horizonte (MG). *Cadernos EBAPE.BR.* 4(3), 1-25.

Silva, V. A., & Fernandes, A. L. T. (2012). Cenário do gerenciamento dos resíduos da construção e demolição (RCD) em Uberaba-MG. *Sociedade & Natureza*, 24(2), 333-344.

Sinduscon - Sindicato da Indústria da Construção (2014). *Dados do setor.*

Souza, F. F., Júnior, P. R. B., Ferreira, D. D. M., & Ferreira, L. F. (2015). Gestão de resíduos sólidos na construção civil: uma análise do relatório GRI de empresas listadas na BM&FBOVESPA. *Navus-Revista de Gestão e Tecnologia*, 5(4), 78-95.

Souza, B. A., Oliveira, C. A. C., Santana, J. C. O. D., Viana Neto, L. A. D. C., & Santos, D. D. G. (2015). Análise dos indicadores PIB nacional e PIB da indústria da construção civil. RDE-Revista de Desenvolvimento Econômico, 17(31).

Teixeira, M. G., Zamberlam, J. F., dos Santos, M. B., & Gomes, C. M. (2016). Processo de mudança para uma orientação sustentável: análise das capacidades adaptativas de três empresas construtoras de Santa Maria-RS. *Revista de Gestão Ambiental e Sustentabilidade, 5(1), 1.*

Tessaro, A. B., de Sá, J. S., & Scremin, L. B. (2012). Quantificação e classificação dos resíduos procedentes da construção civil e demolição no município de Pelotas, RS. *Ambiente Construído*, 12(2), 121-130.

Vasconcelos, C. L., dos Santos, V. M. L., dos Santos Júnior, J. E., & da Silva, T. C. C. (2016). Reciclagem de resíduos de construção e demolição (Rcd): um estudo de caso na usina de beneficiamento de resíduos de Petrolina-Pe. *Revista de Gestão Social e Ambiental*, 10(1), 93.

Yeheyis, M., Hewage, K., Alam, M. S., Eskicioglu, C., & Sadiq, R. (2013). An overview of construction and demolition waste management in. Canada: a lifecycle analysis approach to sustainability. *Clean Technologies and Environmental Policy,* 15(1), 81-91.