COMPARATIVE ANALYSIS OF COST MANAGEMENT IN HIGHER EDUCATION BRAZILIAN FEDERAL INSTITUTIONS

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Cost management is a difficult task in public universities. This research aims to investigate recent experiences of cost management in Brazilian federal higher education institutions (HEFI). This is a qualitative content analysis of management reports from HEFI, by using the Atlas.ti software. The analysis reveals that 40% of the studied HEFI do not make use of a cost evaluation system and that integration obstacles with support information systems complicate cost management. Mandatory insertion of cost center information and legal requirements are the main drivers for HEFI to evaluate their costs. The displaying of data from the Federal Government's cost portal has been recurrent in the management reports. There is a clear need to standardize the cost evaluation methodology and train the HEFI staff. This study reveals how great the challenge is for HEFI to adapt to funding constraints in Brazil.

 Keywords: decision support systems, public sector, federal universities.

ANÁLISE COMPARATIVA DA GESTÃO DE CUSTOS NAS INSTITUIÇÕES FEDERAIS BRASILEIRAS DE ENSINO SUPERIOR

A gestão de custos é tarefa difícil em universidades públicas. O objetivo desta pesquisa é investigar experiências recentes de gestão de custos nas instituições federais de ensino superior (IFES) brasileiras. Trata-se de análise qualitativa de conteúdo de relatórios de gestão das IFES, com o software Atlas.ti. A análise revela que 40% das IFES estudadas não utilizam sistema de avaliação de custos e que barreiras de integração com sistemas de informações de suporte complicam o gerenciamento de custos. A inserção obrigatória de informações sobre centros de custo e os requisitos legais são as principais motivações para as IFES avaliarem seus custos. A apresentação de informações do portal de custos do Governo Federal foi recorrente nos relatórios de gestão. É evidente a necessidade de padronizar a metodologia de avaliação de custos e capacitar o pessoal das IFES. A partir deste estudo, percebe-se a magnitude do desafio para as IFES se adaptarem a restrições financeiras no Brasil.

Palavras-chave: sistemas de apoio à decisão, setor público, universidades federais.

ANÁLISIS COMPARATIVO DE LA GESTIÓN DE COSTOS EN INSTITUCIONES FEDERALES BRASILEÑAS DE EDUCACIÓN SUPERIOR

La gestión de costos es una tarea difícil en las universidades públicas. El propósito de esta investigación es investigar las experiencias recientes de gestión de costos en las instituciones federales de educación superior (IFES) brasileñas. Esto es un análisis cualitativo del contenido de los informes de gestión de IFES, con el software Atlas.ti. El análisis revela que el 40% de las IFES no utilizan un sistema de evaluación de costos y que las barreras de integración con los sistemas de información de apoyo complican la gestión de costos. La inserción obligatoria de información sobre los centros de costos y los requisitos legales son las principales motivaciones para que las IFES evalúen sus costos. La presentación de la información de costos del sitio web de costos del gobierno fue recurrente en los informes de gestión. Es evidente la necesidad de estandarizar la metodología de evaluación de costos y capacitar al personal de las IFES. A partir de este estudio, es posible ver la magnitud del desafío para que las IFES se adapten a las limitaciones financieras en Brasil.

Palabras clave: sistemas de apoyo a la decisión, sector público, universidades federales.

1. INTRODUCTION

Higher Education Federal Institutions (HEFI) in Brazil have lately faced financial constraints that represent a threat to the continuity of their services. Since they are supported almost entirely by resources from the national treasury, the recent Brazilian economic crisis has imposed great challenges to the HEFI, as the pressure for cost control and efficiency increases.

Oliveira *et al.* (2018) predicted that federal universities would face difficulties to sustain themselves, due to budgetary limitations imposed by the Constitutional Amendment No. 95/2016 which established an expenditure cap. A major impact would occur upon resources for investments. In fact, during 2019, the budgetary limitations imposed by the expenditure cap led to several budgetary contingencies to the resources designated to HEFI.

This scenario of resource scarcity, aggravated by the recent coronavirus pandemic, imposes to the federal universities a search for increasing efficiency in their processes. These institutions need to have tools that provide information management to support decision-making in a more assertive way, while also allowing for control refinement.

The search for efficiency can function as a way to gather more resources, given that the Brazilian Ministry of Education (MEC) has expressed its intent to increase the funding to the best-rated federal universities with respect to governance and innovation. MEC intends to revise the distribution model of resources between federal universities, forgoing the size of the institutions in favor of their performances (Fernandes & Tomazelli, 2019).

MEC has proposed the implementation of the Future-se program, using the argument of increasing administrative self-sufficiency of federal universities, encouraging the institutions to increase the funding of their own (MEC, 2019). The institutions that adhere to the proposed program will need to develop tools to keep track of their costs, approximating the operations of public universities to that of private ones, where cost assessment is a well-established practice.

The implementation of cost assessment and management, however, has long proved to be a difficult task for the federal universities, partially because of the heterogeneity of their activities: undergraduate programs, graduate lato-sensu and stricto-sensu programs, and extension services (Peter *et al.*, 2003; Medeiros & Duarte, 2018).

Cost management problems faced by Higher Education Institutions (HEI) have also been discussed in international studies. Monteiro *et al.* (2015), for instance, analyzed the importance of management information stemming from cost accounting of European Public Higher Education Institutions, with emphasis on Portuguese universities. The Brazilian Standards for Accounting Applied to the Public Sector, NBC T 16.11, issued by the Brazilian Federal Accounting Council (CFC) in 2011, established in addition to the concept, the basic rules of measurement and evidence of public sector costs. The standard also addresses the Public Sector Cost Information Subsystem (SICSP) which should be mandatory in all public sector entities. Thus, this requirement promoted in public HEI the use of tools to access and analyze data quickly and facilitate the creation of reports through the Integrated Finance System of the Federal Government Management (SIAFI) (CFC 2011).

For these reasons, a new functionality within SIAFI's expense settlement routine was implemented in April 2018 to address cost information. The resulting routine included a specific tab called "Cost Center", which required the referring month and year of the cost, the Federal Government Organizational Information System (SIORG) code, and the code of the beneficiary Managing Unit.

Under those circumstances, the following research question is raised: how are the recent cost assessment and implementation practices disclosed by the Brazilian federal universities?

The objective of this research is, thus, to investigate the recent experiences of cost implementation and assessment of Brazilian federal universities, when faced with a scenario of performance requirements and limited access to functionalities for cost assessment within the Integrated System for Financial Management (SIAFI). For a better understanding of the main objective of this research, the following specific objectives were established: to identify the cost assessment stages in the Brazilian federal universities; to determine the main challenges presented to these institutions regarding cost assessment; to understand their main motivations to conduct cost assessment; and, to analyze how these universities disclose their information on costs.

This article is structured in five sections. The first section corresponds to this introduction; the second addresses the theoretical background; the third refers to the study methodology; the fourth consists of data collection and analysis; while the fifth section presents the conclusion.

2. THEORETICAL BACKGROUND

2.1. Public administration costs

For Souza *et al.* (2011), the task of cost planning and control supports the decision-making process, highlighting the best conditions for good operational and financial performances. With respect to the public sector, Santos (2011) also upholds the importance of determining costs as a way to gauge the performance of governmental programs, overcome challenges, and promote social and political shifts. Cost management can better direct the use of resources, without impacting the quality of the services. In the public sector, there is a continuous demand for the increase of services and quality of the expenses since profitability is not a goal. Thus, the pursuit of financial control would be directed to an effective allocation of resources and the improvement of an efficient distribution of public expenses (Pereira & Silva, 2003; Bonacim & Araújo, 2010).

For the correct identification of what is effectively referred to as cost within a certain time period, settled expenses are utilized in the accounting process of government costs. This is in accordance with the main goal of Cost Accounting Applied to the Public Sector, which is to assess the cost of provided public services during the pertaining time period (Machado & Holanda, 2010). The term "settled expenses" refers to the stage of an expense operation, called settlement, where the receipt of the product or service is acknowledged (Jund, 2008).

About the conceptual model of Cost System of the Public Sector, Santos (2011) asserts that the settlement stage is the starting point for cost information, by being the stage that more closely resembles the expenditure concept, usually coinciding with the potential decrease in future benefits for the public entity.

A more recent and alternative way to assess costs in the public sector was proposed by Santos (2014), in which cost information is obtained from Diminutive Patrimonial Variations (DPV's). In addition to meeting the contemporary recommendation to prioritize the patrimonial approach, this model circumvents the need to make adjustments to settled expenses, required by the Machado and Holanda model (2010). This is because cost items such as depreciation and consumption of materials are obtained more objectively through DPV's.

Regardless of the model deployed to assess costs, a cost information system in the public sector should provide information that allows the evaluation of resource allocation

efficiency; managers' efficacy in achieving their goals and the effectiveness of public policies in solving problems presented by society (Machado & Holanda, 2010).

In the legal context, cost accounting reached an important milestone in Law 4.320/64 (Brazil, 1964), as expressed in its articles 85 and 99: "accounting services shall be organized in a manner that budgetary operations can be monitored, asset compositions can be known, industrial services costs can be determined, overall balance sheets can be prepared, and financial and economical results can be analyzed and interpreted. […]" Industrial public services, even when not organized as a public or autarchic company, will maintain special accounting for determining costs, entries and, results, without harm to the common asset and financial bookkeeping.

Complimentary Law 101/2000, also known as the Law for Fiscal Responsibility (LRF), in its article 50, compels Public Administration to keep "cost systems that allow the assessment and monitoring of budgetary, financial and asset management" (Brasil, 2000).

In 2001, Law 10.180, with the intent of organizing and regulating the Brazilian Federal Accounting System, attributed to the Federal Accounting System, among other measures, the responsibility to highlight "the costs of programs and units of the Federal Public Administration" (Brasil, 2001).

As a result, Decree 6.976/2009 assigned the National Treasury Office (STN) as the central body for the Federal Accounting System, with the responsibility for "maintaining a cost system that allows the assessment and the monitoring of budgetary, financial and patrimonial management" (Brasil, 2009).

Therefore, STN published the Ordinance 157/2011, establishing the creation of the Federal Government Cost System, structured as an organizational subsystem of the Brazilian Federal Public Administration, linked to the Federal Accounting System, whose objective is "to provide better information content that supports governmental decisions in efficient resource allocation and create appropriate conditions to improve the quality of public expenditures" (Brasil, 2011).

The Federal Accounting Council, by the means of Resolution CFC 1.366/2011, indicates that the Cost Information System in the Public Sector is based on three elements: the accumulation system, the cost system, and the costing method. The method choice should be based on the availability of information and on the volume of necessary

resources to obtain data or information. Entities may adopt more than one costing method, depending on the characteristics of the costing objects.

While investigating experiences of implementing cost systems in the international arena, Messias, Ferreira and Soutes (2018) drew a conclusion that, as in Brazil, public administration in many countries still need to reinforce their cost management structures. The authors identified the integration of cost systems to other structural systems and to strategic planning as obstacles for employing techniques of cost management.

2.2. Costs in higher education institutions

For Batista *et al.* (2017), the subject of costs in the public sector has a special relevance for the HEFI. These institutions operate on a wide spectrum of education, research, and extension activities, with a great diversity, such as laboratory maintenance, university hospital management, museum maintenance, and book editing, to name a few. The variety of activities demonstrates the difficulty of establishing a system for cost assessment in these institutions.

In a similar way, Medeiros and Duarte (2018, p. 4) show the inherent complexity of HEFI and say that the role of HEFI "becomes more and more challenging, taking into consideration the resource scarcity, the multiplicity of services, the fixed high-cost structures, and a rigid structure of external and internal control of their actions." In fact, cost management in the public sector, notably in federal universities, is of great importance, since financial information may be used "for establishing standards, budgeting and expenses projections, and also for monitoring whether the accomplished results are in accordance with their pre-established values." (Magalhães *et al.*, 2010, p. 639).

Cost management is also a concern in private higher education institutions. Soares *et al.* (2009) note the importance of strategic management of costs in the competitive higher education market. For these institutions, cost management is a tool capable of bringing the necessary information to define business policies, as well as optimizing the use of resources, avoiding waste.

In fact, given the diversity of the activities performed in federal universities, defining a model for cost assessment becomes a difficult task. Reinert and Reinert (2005) reviewed several cost assessment proposals for federal universities in order to suggest an

optimized model in relation to previous proposals. The authors concluded that an appropriate model for federal universities would have their costing based on teaching activities, which would adopt the hour of teaching activity as cost guidance. This is basically because the main forms of expenditures of higher education institutions are teaching costs which include labor costs, research and extension costs, and administration and maintenance costs. It is noteworthy the fact that this cost classification is applied to both public and private institutions in Brazil (Soares *et al.*, 2009).

Activity-based costing (ABC) has also long been considered for universities. Peter *et al.* (2003) analyzed the characteristics of the ten biggest federal universities in Brazil and concluded that ABC should be the ideal method for cost assessment.

More recently, Costa Junior (2016) carried out an analysis of the accounting and financial system of the Federal Institute of Paraíba (IFPB), with the purpose of proposing the implementation of the Federal Government's Cost Information System (SIC) in the institute. The author highlights the importance of the SIC as an accounting management tool, useful to support decision making. The study lists some of the challenges imposed on the implementation of SIC, such as accounting entries standardization to ensure cost comparability, modification to the asset control system, and the creation of a model unit, a pilot project, which can be replicated to the rest of the institution. The implementation of those systems requires higher administration involvement, and the correct registration of movable assets depreciation and material consumption. The registration of depreciation and material consumption in the Brazilian HEFI, can be optimized by the adoption of the Integrated System of Services Administration (SIADS), an information system developed by the federal government, capable of migrating depreciation and material consumption cost information to SIAFI (Costa Junior, 2016).

It is noteworthy to mention that federal institutes also have a role in the higher education scenario, and have similar characteristics to universities, with regard to the needs for cost assessment. Therefore, the difficulties pointed out by Costa Junior (2016) are certainly extended to federal universities.

In the study carried out by Santos (2017), cost assessment models applicable to federal universities were investigated, in order to identify which ones meet the accounting essence. The author considered the international accounting standard applied to the public sector, established by the International Federation of Accountants (IFAC), as an accounting essence. Considering the embraced premises in the study, the author identified

the models of Reinert and Reinert (2005) and Machado (2002) as the most appropriate, which sought an approximation between cost accounting and the concepts applied to public accounting.

Santos (2017) mentions that cost assessment, from the perspective of cost of the programs and of the budgetary actions, raises a question regarding the criteria for cost allocation. According to the author, it is not objectively established if cost assessment should be based on the budgetary origins of the expenditure or on the realization of an economic benefit. The conflict between the budgetary and patrimonial concepts is intertwined to the theme of expenditures in public administration and presents a challenge for the association of essentially patrimonial variables, such as depreciation and consumption from inventories.

In this context, Xavier Junior *et al.* (2019a) conducted a case study at the Federal Rural University of the Semi-Arid (UFERSA) to evaluate which of the two models – the budgetary model by Machado and Holanda (2010) or the patrimonial model by Santos (2014) – would be able to generate cost information in a more practical and reliable way. Based on data from the 2018 financial year, the authors concluded that the patrimonial model would be the most appropriate for that HEFI. Accordingly, the application of the patrimonial model is gradually being disseminated: for instance, Xavier *et al.* (2019b) relied on it to identify a correlation between performance and costs of Brazilian federal universities.

3. METHODOLOGY

This research is an exploratory and descriptive investigation of the experiences of implementation and cost assessment within the scope of Brazilian Federal Universities, taking the management reports published on the website of the Brazilian Federal Court of Accounts (TCU) as reference. According to Richardson (2015), this research is classified as exploratory, for it seeks to understand a little-known phenomenon to expand the knowledge of a given reality.

This study also embraces a qualitative approach, exploring and understanding the given meaning to a social and human problem by an individual or a group, analyzing data inductively, from particularities to general themes, and interpreting the meaning of the data (Creswell, 2010).

The data sources for this research are management reports provided by Brazilian

federal universities, institutions of indirect federal administration with legal personality of autarchies and public organizations linked to MEC. The reports are documents presented annually to TCU by the officers of the jurisdictional units, listed by normative decision as an integral component of the accounts rendered.

Out of the 68 universities by MEC, 63 reported to TCU by the means of their Management Reports, pertaining to the year of 2018. Ten universities did not present any cost data in their reports, while 2 institutions did submit their Management Reports to TCU but, as of 8th of September 2019, the reports were still under processing, which prevented their reading (Table 1). Therefore, in that regard, the current study was accomplished using costs information inserted in the reports of 51 universities, which characterizes the sample of this study (Table 2).

Table 1 | HEFIs not included in the study sample

2018 Report Status	Number of universities	Name of University	State	Acronym
Not submitted to TCU	5	Universidade Federal de Catalão	GO	UFCAT
		Universidade Federal de Jataí	GO	UFJ
		Universidade Federal de Rondonópolis	MT	UFR
		Universidade Federal do Agreste de Pernambuco	PE	UFAPE
		Universidade Federal do Delta do Parnaíba	PI	UFDPAR
Under processing	2	Universidade Federal da Paraíba	PB	UFPB
		Universidade Federal de São Paulo	SP	UNIFESP
No cost information	10	Universidade Federal de Goiás	GO	UFG
		Universidade Federal de Sergipe	SE	UFS
		Universidade Federal do Acre	AC	UFAC
		Universidade Federal do Espírito Santo	ES	UFES
		Universidade Federal do Estado do Rio de Janeiro	RJ	UNIRIO
		Universidade Federal do Oeste da Bahia	BA	UFOB
		Universidade Federal do Oeste do Pará	PA	UFOPA
		Universidade Federal do Paraná	PR	UFPR
		Universidade Federal do Recôncavo da Bahia	BA	UFRB
		Universidade Federal Rural do Semi-Árido	RN	UFERSA

Source: MEC; authors' analysis.

Table 2 | HEFIs included in the sample of the study

Number of universities	Name of University	State	Acronym
	Fundação Univ. Federal de Ciências da Saúde de Porto Alegre	RS	UFCSPA
	Fundação Universidade Federal da Grande Dourados Fundação	MS	UFGD
	Universidade Federal de Rondônia	RO	UNIR
	Fundação Universidade Federal de Roraima	RR	UFRR
	Fundação Universidade Federal do ABC	SP	UFABC
	Fundação Universidade Federal do Pampa	RS	UNIPAMPA
	Fundação Universidade Federal do Tocantins	TO	UFT
	Fundação Universidade Federal do Vale do São Francisco	PE	UNIVASF
	Universidade da Integração Intern. da Lusofonia Afro-Brasileira	CE	UNILAB
	Universidade de Brasília	DF	UNB
	Universidade Federal da Bahia	BA	UFBA
	Universidade Federal da Fronteira Sul	SC	UFFS
	Universidade Federal da Integração Latino-Americana	PR	UNILA
	Universidade Federal de Alagoas	AL	UFAL
	Universidade Federal de Alfenas	MG	UNIFAL
	Universidade Federal de Campina Grande	PB	UFCG
	Universidade Federal de Itajubá	MG	UNIFEI
	Universidade Federal de Juiz de Fora	MG	UFJF
	Universidade Federal de Lavras	MG	UFLA
	Universidade Federal de Mato Grosso	MT	UFMT
	Universidade Federal de Mato Grosso do Sul	MS	UFMS
51	Universidade Federal de Minas Gerais	MG	UFMG
	Universidade Federal de Ouro Preto	MG	UFOP
	Universidade Federal de Pelotas	RS	UFPEL
	Universidade Federal de Pernambuco	PE	UFPE
	Universidade Federal de Santa Catarina	SC	UFSC
	Universidade Federal de Santa Maria	RS	UFSM
	Universidade Federal de São Carlos	SP	UFSCAR
	Universidade Federal de São João Del Rei	MG	UFSJ
	Universidade Federal de Uberlândia	MG	UFU
	Universidade Federal de Viçosa	MG	UFV
	Universidade Federal do Amapá	AP	UNIFAP
	Universidade Federal do Amazonas	AM	UFAM
	Universidade Federal do Cariri	CE	UFCA
	Universidade Federal do Ceará	CE	UFC
	Universidade Federal do Maranhão	MA	UFMA
	Universidade Federal do Pará	PA	UFPA
	Universidade Federal do Piauí	PI	UFPI
	Universidade Federal do Rio de Janeiro	RJ	UFRJ
	Universidade Federal do Rio Grande	RS	FURG
	Universidade Federal do Rio Grande do Norte	RN	UFRN
	Universidade Federal do Rio Grande do Sul	RS	UFRGS
	Universidade Federal do Sul da Bahia	BA	UFSB
	Universidade Federal do Sul e Sudeste do Pará	PA	UNIFESSPA
	Universidade Federal do Triângulo Mineiro	MG	UFTM
	Universidade Federal dos Vales do Jequitinhonha e Mucuri	MG	UFVJM
	Universidade Federal Fluminense	RJ	UFF
	Universidade Federal Rural da Amazônia	PA	UFRA
	Universidade Federal Rural de Pernambuco	PE	UFRPE
	Universidade Federal Rural do Rio de Janeiro	RJ	UFRRJ
	Universidade Tecnológica Federal do Paraná	PR	UTFPR

Source: MEC; author's analysis.

To achieve the established goals for this study, documental research was embraced as a strategy. The analyzed documents were the management reports which, in addition to being presented to TCU, were available to society through the TCU website and the universities websites, constituting an important instrument for transparency. The use of documental research can be an advantage because, according to Cellard (2008), to some extent, eliminates interference resulting from the presence or intervention of the researcher.

For data analysis, the content analysis technique was chosen (Bardin, 2016). According to Chizzotti (2010), content analysis consists of correlating the recurrence of the quotations of some subjects, words, or ideas in a text to measure the given relative importance to a certain topic by its author.

The steps taken in the content analysis of the management reports follow the three chronological hubs defined by Bardin (2016): i) pre-analysis; ii) exploration of management reports; iii) handling of results, inference, and interpretation.

For documental analysis, a floating reading was employed as the initial step in order to identify, in a preliminary manner, the main topics of interest of the documents, considering the defined objectives for this study and the theoretical discussion carried out by literature reviews.

Next, the documents were explored, with the use of the software Atlas.ti 7.0, categorizing the passages deemed relevant to the study. In the results obtained using the software, codes are linked by arrows to their units, represented by an ordered pair of two numbers [x – y], with "x" being the number of quotes to which the content has been related, and the "y" representing the number of other content to which it is linked.

For the last step of content analysis, inferential interpretations were carried out, which represent the moment of intuition and the reflective and critical analysis described in the following section.

4. RESULTS

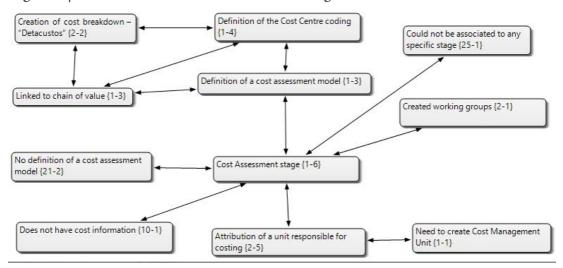### 4.1. Cost Assessment Stages

As previously mentioned, 51 out of 61 federal universities whose management report was obtained from the TCU website included some sort of information regarding cost assessment in the reports. It turns out that approximately 41% of those 51

universities -21 universities - informed that they have not embraced a cost assessment system yet. Additionally, 2 universities created working groups, 2 universities have set up a unit responsible for costing, 1 university selected a cost system, and the remaining 25 could not be associated to any specific stage (Table 3).

Table 3 | Stages of cost information

Number of Universities	University Acronym	Stage
1	UFRN	Definition of cost assessment model
2	UFAM, UFMS	Creation of working group responsible for cost assessment
2	UFGD, UFRRJ	Attribution of unit responsible for costing
21	UFABC, UFCG, UFCSPA, UFF, UFMG, UFOP, UFPEL, UFSC, UFSJ, UFTM, UFVJM, UNB, UNIFAL, UNIFAP, UNIFEI, UNIFESSPA, UNILA, UNILAB, UNIR, UNIVASF, UTFPR	No definition of cost assessment model
25	FURG, UFAL, UFBA, UFC, UFCA, UFFS, UFJF, UFLA, UFMA, UFMT, UFPA, UFPE, UFPI, UFRA, UFRGS, UFRJ, UFRPE, UFRR, UFSB, UFSCAR, UFSM, UFT, UFU, UFV, UNIPAMPA.	Not possible to associate to a stage

Source: Authors' analysis.

In total, thereby, four stages were clearly identified: no definition of a cost assessment model, creation of a working group responsible for cost assessment issues, definition of a cost assessment model, and attribution of a unit responsible for costing. Figure 1 presents the semantic network of cost assessment stages in the federal universities.

Figure 1 | Semantic network of cost assessment stages

* Each pair (x-y) represents the number of quotes 'x' related to that specific content and the number of other contents 'y' that specific content is linked to.
Source: Elaborated by the authors.

An analysis of the 26 institutions associated to these stages leads to no identification of standard patterns regarding their stages of cost assessment. There are HEFI of different sizes and different regions in the country in distinct stages of cost assessment implementation.

The Federal Fluminense University (UFF), for example, has clearly admitted it does not have a cost assessment system. A similar approach is found in the management report of the Afro-Brazilian Lusophony Inclusion University (UNILAB): "UNILAB does not have yet a cost management plan." Also, the Federal University of São João Del Rei (UFSJ), with no cost assessment system, acknowledges its vulnerability: "Cost Management is an important subject that is still not systematically executed by the institution."

The institutions that have not implemented a cost assessment system search for alternative ways to provide information to managers. This is the case for the Federal University of Amapá (UNIFAP) which states: "we are in the process of internal restructuring, along with the definition of a methodology, to implement this system. Currently, any cost assessment needs are carried out based on surveys and Excel spreadsheets."
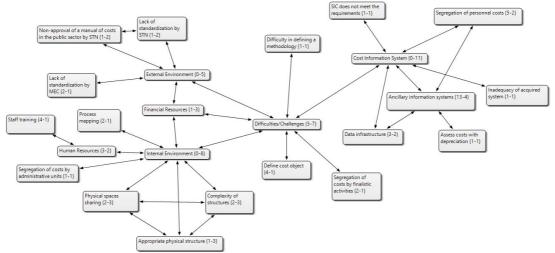
Only three institutions have already created a dedicated unit for cost assessment

and management in their organizational structure. Those units are usually located in the sector responsible for planning and institutional evaluation of the university, as in the cases of the University of Brasília (UNB) and the Federal University of Grande Dourados (UFGD). The Federal University of Rio Grande do Norte (UFRN) has become a reference to other HEFI on cost assessment, with the establishment of a cost assessment template based on its value chain and a cost center coding to breakdown the settlements costs within SIAFI.

4.2. Difficulties on cost assessment

Taking cost assessment and management into practice has been an arduous assignment for HEFI. In Figure 2, the semantic network that represents the main difficulties and challenges faced by federal universities in the process of implementing a cost assessment system can be observed.

The difficulties related to ancillary information systems were the most frequently quoted on the management reports, with 13 quotations. This was expected because to assess costs, data that stems from several information systems are required. The challenge is to standardize and consolidate these data in the cost assessment task. Other difficulties presented were the lack of staff training, with 4 citations, and the non-definition of cost objects, also with 4 citations.

Figure 2 | Semantic network of difficulties and challenges when assessing costs

* Each pair (x-y) represents the number of quotes 'x' related to that specific content and the number of other contents 'y' that specific content is linked to. Pairs with 0 quotes have been created by the authors to consolidate the large variety of codes into similar topics.
Source: Elaborated by the authors.

In some situations, embracing new systems is essential. This is the case for the Integrated Service Administration System (SIADS), which automates the recording of depreciation costs. As noted by UNB, "the Ministry of Planning, now the Ministry of Economy, has also made mandatory the utilization of SIADS to assess costs stemming from depreciation expenses of movable and immovable assets of special use".

For HEFI, the most relevant expense is personnel. The cost data for personnel can be processed by the Federal Government Cost Information System (SIC), which is able to integrate the main systems of the Federal Government. The Personnel Management Integrated System (SIAPE) and the Federal Government Organizational Information System (SIORG) are two of those systems. The integration is not straightforward, as the Federal University of Amazonas (UFAM) noted in its management report: "the correct feeding of personnel distribution and compensation data from SIAPE, as well as of the updated management organizational chart from SIORG, are necessary".

In addition to adjustments or substitutions of information systems used by the universities, the implementation and the subsequent management of a cost assessment system require adaptations related to the staff involved in this task. The University of Rondônia (UNIR), for instance, acknowledges that "with some personnel redistribution and training, a cost system should be implemented next year".

In its management report, the Federal University of Pampa (UNIPAMPA) states they are "aware of the need for cost control". Thus, they "fostered a course on Cost Accounting Applied to the Public Sector, in October 2018, in order to instill the notion about how cost control works through settlements, as well as through the budget control, for employees of the Finance and Accounting Divisions (CCF) and of the Budget Division of Proplan".

According to Resolution CFC 1.366/2011, one of the cost information attributes is the comparability. It happens that, for comparability to be achieved, a standardized cost assessment methodology is necessary. In this context, the Federal University of Pará (UFPA) notes that "MEC has still not standardized cost assessment for Federal Universities".

Along those lines, the Federal University of Vale do Jequitinhonha and Mucuri (UFVJM) informs that they "do not yet have a methodology to assess costs within the scope of the unit". UFVJM waits for guidelines from the superior instance (MEC) for its implementation as it recognizes "the great complexity of creating a methodology capable

of safely and accurately measuring the costs of programs and administrative units".

The Federal University of Pará (UFPA) points out the absence of approval of a public sector cost manual by STN as one of the challenges when assessing costs. However, contrary to this observation, the Federal Government's Cost Information Manual, which provides detailed information about the utilization of SIC within the scope of the federal government, is available on the National Treasury website (Brazil, 2018).

Finally, issues related to the physical structure of universities and to the data sharing between all layers within the institutions also concur to make cost assessment a difficult task. In that respect, the Federal University of Mato Grosso do Sul (UFMS) mentions: "in order to calculate the unit cost a student in UFMS courses, the main challenge for consolidating financial information is the apportionment of shared expenses in the College Town (Campo Grande/MS) and the information breakdown related to the staff payroll".

4.3. Motivations to assess consts in federal universities

The recent worsening of the budgetary and financial situation of the Brazilian HEFI has sparked the urgency for cost management efficiency. Several reasons for the universities to implement a cost assessment and management system have been revealed. In Figure 3, the semantic network with the motivations to assess costs is shown, presented in management reports by federal universities.

The compulsory filling of the cost center on the payments tab within SIAFI and other accounting registration requirements, such as that of depreciation, are recurrently cited in the management reports, with 17 quotations. STN plays a role in every federal government institution by making the filling of these accounting records in SIAFI mandatory. It has become possible to use the cost information recorded in SIAFI integrated with the information from other supporting systems of the federal government. The Cost Information Manual of the Federal Government presents information regarding how public bodies can utilize the Business Intelligence (BI) Managerial Treasury tool to extract and organize cost data from several federal government cost systems (Brasil, 2018).
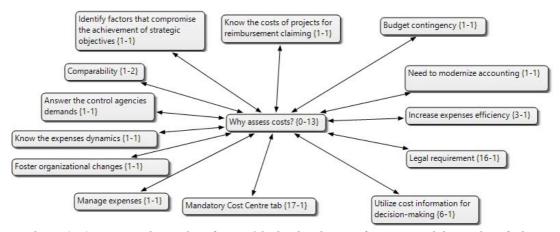
Figure 3 | Semantic network of motivations for cost assessment

* Each pair (x-y) represents the number of quotes 'x' related to that specific content and the number of other contents 'y' that specific content is linked to.
Source: Elaborated by the authors.

Besides, the possibility of using cost information for decision making and increasing the efficiency of spending were also pointed out as motivators for costing, with 6 and 3 citations respectively. In fact, the need to assess costs in federal universities also stems from a legal requirement. The Federal Rural University of Amazônia (UFRA) has an item in its management report that demonstrates the legal compliance of cost management in the public sector. In this item, the Fiscal Responsibility Law (LRF), the STN Ordinance 157/2011, the Federal Law 4.320/64, and the Federal Decree Law 200/1967 are mentioned. Therefore, it is clear that cost assessment in federal universities is supported by legal imposition.

Complementarily, the Federal University of Alagoas (UFAL), for example, quotes a practical application of cost information, which consists of "knowing the expenses of developed projects, making it possible to claim compensation for indirect expenses of these projects." Accordingly, cost information is critical to a potential billing of lato-sensu postgraduate courses.

4.4. Disclosure of cost information by federal universities

Considering the fact that assessing costs in federal universities is still a recent activity , but important, given the transparency requirements of public institutions, it becomes relevant to evaluate how the HEFI are disclosing information about their costs.

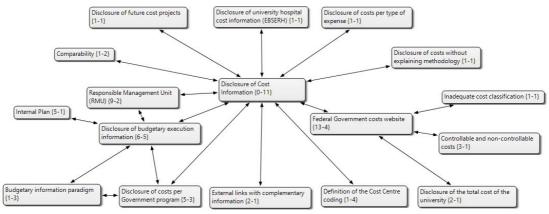Figure 4 presents the semantic network that highlights cost information in universities.

Figure 4 | Semantic network of disclosure of cost information

* Each pair (x-y) represents the number of quotes 'x' related to that specific content and the number of other contents 'y' that specific content is linked to.
Source: Elaborated by the authors.

Universities often referred just to the costs website of the Brazilian federal government (http://www.tesourotransparente.gov.br/temas/contabilidade-e-custos/sistema-de-custos) when presenting cost information in their management reports, with 13 citations. This website is open to the public in general and allows access to interactive panels with information stemming from the combination of data from the supporting systems of the federal government (Brasil, 2019).

The Federal University of Roraima (UFRR), for example, stated, in its management report, that "the cost assessment task of this institution is being conducted utilizing the Federal Government's website. The website is a project developed by the Cost Information Department of the National Treasury Public Accounting Bureau." Making cost information available through open access is important as a transparency initiative. However, this kind of information is not relevant for use as a subsidy for decision-making because it does not take into account the specific information needs of the universities.

Some universities, however, have disclosed information of a budgetary nature such as control by Responsible Management Unit (RMU) (with 9 citations). Reports (with 6 citations) of budget numbers were also identified as if they were cost numbers, demonstrating their limited knowledge of the necessary adjustments between these values (Machado & Holanda, 2010).

5. CONCLUSION

The analysis of the management reports released by Brazilian federal universities revealed that, out of the 61 documents acquired on the TCU website, 10 did not contain information on cost assessment. Furthermore, 21 universities informed that they have not adopted any cost assessment system, despite including in their management reports passages on cost assessment.

Regarding the current cost assessment stages, situations were heterogeneous. While some institutions, despite recognizing the importance of cost assessment, remain at the research stage to define a methodology, others have already decided on one. UFRN, for example, moved ahead and defined a coding to be utilized on the process of data feeding in the SIAFI, becoming a reference to other universities in this regard.

As to the difficulties related to the implementation of cost assessment and management, the inadequacy of supporting information systems and the lack of a defined cost methodology from MEC have been emphasized.

The identification of problems resulting from the integration of cost systems with other complementary information systems coincides with international findings, as evidenced by Messias, Ferreira and Soutes (2018).

The compulsory filling of the cost center on the SIAFI expenses payments tab, established by STN during the year of 2018, has appeared as a relevant event to motivate the universities to implement measures to assess and manage costs. It is worth mentioning that the necessity to assess and manage costs within the scope of the Brazilian federal public administration also results from a legal requirement and is essential for subsidizing the public manager's decision making.

Some initiatives from universities related to the disclosure of cost information were identified, primarily on the costs website of the federal government. Such initiative can be considered a positive factor with regard to transparency. Nonetheless, the information disclosed in this website has limited use for decision making.

The results found by this study alert the necessity to establish a methodology that includes a minimal standard to assess costs in the federal universities. A defined standard will make the comparison of costs between institutions possible, the identification of successful practices in the cost management, and the use of cost information as a measure of efficiency, efficacy, and effectiveness of the universities' management.

The universities must observe the fact that STN made available for them tools to assist with cost assessment, which became relevant due to the compulsory filing of the cost center tab and the federal government financial costs manual release. These tools consider the importance of gathering information from the federal government's supporting systems.

It is suggested for future research that the study is reapplied shortly, since numerous ongoing cost assessments initiatives were identified among HEFIs. Another suggestion to approach the theme is the realization of in-depth studies in universities that have already made substantial progresses on the task of cost assessment in order to capture detailed aspects of cost assessment not revealed in the management reports. Other government bodies in the federal, state, and municipal levels can also benefit from the HEFI's experience with the implementation of cost assessment.

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