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# USABILITY OF THE FEDERAL PUBLIC SECTOR COST SYSTEMS

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## ABSTRACT

The objective of this study was to identify the perception of the usability of the Federal Public sector cost systems by the managers and cost information users. To this end, a survey was carried out with sector and sectionals of costs of the Federal Government, using a questionnaire that was validated by *brainstorming* and by focal group. The research quantitative data were obtained from the application of the multicriteria analysis model for decision support - Constructivist *"Multicriteria Decision Aid - Constructivist"* (MCDA-C). The results, generated in the MyMCDA-C *software*, showed that nine criteria reached the optimum points, reaching an excellent level of usability, which were considered to be very significant for achieving the objectives of using the cost systems. The greatest effort was for "cost methodology" and the lowest for "technology tools." In practical terms, it was evident that the effort to seek a cost methodology relevant to the agency's objectives is greater than the technological tools currently available. The research also aimed to contribute based on literature to future studies on usability in the accounting sciences area and to subsidize public sector entities upon listing in this work criteria for implementing costs with a focus on usability.

**Keywords:** Usability Assessment. Costs Applied to the Public Sector. Cost Accounting.

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## 1 INTRODUCTION

Cost accounting is a system that aims to measure the total financial resources that are needed to produce a product or service (Mohr, 2016), it is also responsible for the process of measuring the cost of inputs, whether: materials, human or technological, and products (goods and services generated). In addition, it makes it possible to measure the performance of private entities, as well as to evaluate public sector entities, as to the ability to provide public services and whether to provide them efficiently (Secretaria do Tesouro Nacional, 2018). It has been developing and gaining greater relevance due to several factors, one of which is the advancement of information technology, as highlighted by Martins e Rocha (2015).

According to the Secretariat of the National Treasury (STN), the Federal Government has developed and proposed guidelines, methods and procedures to support the implementation of a Cost System in the Federal Public sector.

In March 2011the Ministerial Order 157 of STN created the Federal Government's Cost System, which is a "structuring system", composed of STN as central body and sector bodies (internal management units of federal public entities). In October 2011, the Ministerial Order number 716 of STN brought the definition of an "information system" of the Federal Government, whose purpose is to monitor, evaluate and manage the costs of the Federal Public Administration programs and units, called: Cost Information System (CIS) (Secretariat of the National Treasury, 2011a).

CIS is *a Data Warehouse* that selects and extracts data from the systems, such as the Integrated System of Federal Government Financial Administration (SIAFI), the Integrated System of Human Resources Management (SIAPE), and the Integrated Planning and Budgeting System (SIOP). According Machado e Holanda (2010) to, SIC has the advantage of generating cost information in a synthetic manner, however, comparable with the entire federal public administration, making it useful for evaluating performance and results of public policies.

In the STN understanding, the tool provides subsidies to identify improvements in public services, as well as to analyze efficiency, effectiveness, cost-effectiveness and evaluation of results regarding the use of public resources.

The creation of SIC, according to Elias (2017), was extremely relevant for the proper measurement of costs within the Federal Government. According to Souza et al. (2017), the possibilities of data extraction through the Management Treasury (TG) and SIC provided a new methodological analysis, allowing the analysis of cost data correlated with budget data and presented in multiple management views to be feasible, using *business intelligence* (BI) tools.

The advance of technology in recent years is relevant, as Martins e Rocha (2015) point out, and the fact provides for the assessment of costs in a systemic and low cost manner. Machado, Holanda e Bezerra Filho (2018) Highlight that once the cost system is implemented in the proposed model, the agencies can build their own specific accounting-management information system models for analysis and management of their costs.

Therefore, considering that usability refers to the efficiency, effectiveness and satisfaction with which users are able to achieve specific objectives in specific usage contexts with computerized systems (Associação Brasileira de Norma Técnica, 2002; Rocha & Sirihal, 2014), and aware of technological advancement, this study aims to address the concepts of public cost accounting and usability in the federal public sector cost systems, through research based on the Multicriteria Analysis Model for Decision Aid – Constructivist *"Multicriteria Decision aid"* (MCDA-C), in order to identify the following question: what is the perception of usability of the Federal Public sector cost systems by managers and users of cost information in the public sector?

To this end, the text is distributed in five chapters. In the first chapter the subject is introduced, the second is the literature review, which raises the concepts of cost accounting in the public sector, its available technologies and system usability. In the third chapter, the research method is reported, while in the fourth, the contributions, results and analyzes of the usability of

public cost systems are exposed. Finally, in the fifth and final chapter, the final considerations are made.

## 2 THEORETICAL BASIS

### 2.1 Cost Accounting in the Public sector

Cost Accounting, according to Martins e Rocha (2015), is responsible for the process of measuring the cost value of several entities of interest to the administrators, with the purpose of using information that allows decisions to be made about the most varied management events. According to Elias (2017), it is important to comply with the Federal Constitution and to comply with the principles of advertising and economics, as well as in the process of accountability and rendering accounts.

Law number 4.320, of March 17th, 1964 (1964), initiated the obligation to calculate costs in the public sector, but only in industrial institutions. After this period, a series of laws, decrees, ministerial orders, resolutions, judgments and reports were issued normalizing and evolving to cost management and calculation in the public sector (Carneiro et al., 2012; Elias, 2017; Padrones, Santos & Colares, 2017).

The standard approved by the Federal Accounting Council (CFC), by means of Resolution 1366 of 25/11/2011, NBC T 16.11(CFC, 2011b), which deals with the Public sector Cost Information System, has been going through the process of convergence to international standards. It is currently applied to all entities in the public sector and will be in force until the first day of January 2024, because it will be revoked by NBC TSP 34 (CFC, 2021) and reinforces the determination of several legal devices for cost-checking in public entities, such as transparency and accountability requirements, contributing to internal, external and social control. The standard also highlights the value of cost information for managerial purposes and highlights its relevance to the public interest, understood as the one that impacts on public management, from a legal point of view or its usefulness.

Another normative pertinent to the theme is the conceptual framework for the elaboration and dissemination of General Purpose Accounting Information by Public sector Entities (NBC TSP), which in turn brings qualitative characteristics.

Among these characteristics, the attributes are observed of the cost information in which timing is highlighted. It is understood as information available to the user before the same loses his or her ability to be useful for rendering of accounts, accountability, and decision making purposes.

Another qualitative characteristic is the relevance that helps to reaffirm the importance of cost accounting and its adoption in the public sector (Machado, Holanda & Bezerra Filho, 2018). It is understood as relevance the information capable of significantly influencing the fulfillment of the purposes of the preparation and disclosure of accounting information.

To do so, it is necessary to implement mechanisms for evaluating results and performance in the public sector based on cost information, inducing management improvement, as reported by Machado, Holanda e Bezerra Filho (2018).

In this sense Padrones, Santos e Colares (2017) , point out that STN has been making changes in its cost standards in relation to Law 4.320/64, understanding that it should be consistent with accounting principles and adherence to international standards applied to the public sector, leaving the budget control bias to meet the object of public accounting, not only serving for compliance with legislation but also as an auxiliary decision-making tool.

Thus, Machado e Holanda (2010) mention that cost information can subsidize the planning and budget process, support management decisions, evaluate certain goods or services produced by the government, and make the information generated useful and appropriate to the decision-

making process, and facilitate the manager's task in seeking to maximize the results of public resources.

At the global level Verbeeten (2011) reinforce that cost information is used for planning, budgeting, pricing, evaluation and government performance control.

However, previous studies show that there is difficulty establishing a cost system in public administration, due to cultural and economic issues (Padrones, Santos & Colares, 2017), resistance to change (Monteiro, 2018), fear of presenting the details of the public expenditure that should be made available to society (Reis & Lavarda, 2017), absence of a control mechanism that sanctions non-compliance in the costs implementation (Pereira & Romão, 2016), lack of personnel, complexity of processes and services, lack of structure and absence of superior organs definitions (Santos & Voese, 2019), operational difficulties, lack of qualified personnel, unfamiliarity or lack of access to the Federal Government Accounting System (Costa et al., 2018) and even of public programs and services managers that are particularly contrary to the use of cost accounting in their services, making use of budgetary means (Mohr, 2016).

Despite the barriers and difficulty, Souza et al. (2017), when reporting the experience of the Brazilian Communication Company (EBC), demonstrate that it is possible to use existing technological methodologies and tools and to obtain success in calculating the costs of the entity/public body, to do so, they report that there is an investment and effort in *benchmarking* in public bodies and entities, meetings with internal teams, search for concepts and guidelines with technical bodies, participation in congresses, seminars, symposia and cost meetings in the public sector to consolidate the cost model and make it available and accessible to users for full use.

Other cases that were successful in the cost systems implementation , which followed the flows of procedures guided by STN and started to use as a governance instrument were: Command of Aeronautics (Comaer), Ministry of Finance (MF), Solicitor General of Brazil (AGU) and National Supply Company (Conab), as reported by Secretaria do Tesouro Nacional (2018).

## 2.2 technologies available to calculate costs in the public sector

Machado, Vianna e Matias (2020) report that the technology is imbricated in several social, economic and governmental segments, being responsible for supporting the various work and production processes, influencing even trends in everyday life.

Therefore, NBC T 16 stands out11, which recommends the use of tools that allow fast access to data, combined with database technologies to facilitate reporting and data analysis. It also mentions that public services should be identified, measured and reported in a system designed for public service cost management, as well as capturing information from other information systems of the public sector.

In this sense, STN makes Federal Government Cost Portal available, whose scope is intended to the direct and indirect administration bodies and entities included in the fiscal and social security budgets of the Federal Government General Budget, with the aim of being a cost management tool, in order to assess the quality of public spending and to be a mechanism for supporting decision-making, with sectoral, central and overall analysis of the costs of the Federal Government's administrative units (Secretaria do Tesouro Nacional, 2019).

STN make SIC available, whose aim is to monitor, evaluate and manage the costs of the Federal Public Administration programs and units, and to support managers in the decision-making process (Secretaria do Tesouro Nacional, 2011b). The use of this tool makes it possible to meet the NBC T 16.11 by mentioning that the cost information must be adequately treated, with an appropriate technological approach that provides for the multiple dimensions (temporal, numerical and organizational, etc.), allowing the analysis of historical series of costs from the perspective of the public sector's target administrative activities.

According to Lorenzato, Behr e Goularte (2016), SIC is a tool used to achieve and improve the results, processes and analysis of public management alternatives, and that makes it possible to provide transparency and quality of public spending.

Thus, SIC information is extracted through the technological tool called TG, where financial, economic, budgetary and financial information is consulted and traded daily from the structural systems of the Federal Government, such as SIAFI, SIPE and SIOP.

TG was launched by STN and with free access, consisting of *a business intelligence* platform , which allows dynamic reporting (with pivoting, *drill* and display filters features), allowing data modularity to be worked on, building complex documents, generating dynamic panels, and scheduling queries (Secretaria do Tesouro Nacional, 2018).

It is worth highlighting the studies of Santos e Voese (2019), which point out that in addition to the use of SIC, some bodies/entities make use of third party ERP, spreadsheets of calculations and own systems in the system projects to determine costs.

Regardless of the type of tool that the entity uses Machado e Holanda (2010) , they advise that it is essential that users understand the usefulness of cost information in the public sector to control and improve the management and improvement of the decision-making process.

Thus, considering the available technological tools, the current legislation relevant to costs in the public sector, the guidelines of the central accounting bodies established through the STN, the Brazilian Accounting standards applied to the public sector, the conceptual and academic guidelines available in the accounting literature regarding cost accounting, the aim is to use the concepts of the systems usability to focus on investigations into user interactions (public managers) and public costs, from the interfaces, applications and cost systems in the federal public sector.

## 2.3 Systems Usability

According to Nielsen (2012), usability is a quality attribute that evaluates how user interfaces are easy to use, also refers to methods to improve the ease of use during the design process. The author depicts usability in five quality components: learning, efficiency, memorability, errors and satisfaction. The author points out that usability is present in any degree of user experience, from installation to maintenance.

The concept of usability can also be understandable to contexts that are not software development or digital interfaces, and the form of interaction between product or system and user can be explored, in order to achieve the result that a product or system is proposed to achieve, as highlighted by Rafael.

According to Fallman (2011), usability is a collective term for a particular set of ideas developed primarily in human-computer interaction about the relationships among users, analysts, designers, artifacts, and the context in which the design takes place. Although the term usability is associated with computer science in studies of interactions between people and computers, the concept can be addressed in different contexts (Rocha & Sirihal, 2014; Silva et al., 2017).

Corroborating Fallman (2011), the authors Rocha e Sirihal (2014) understand that the area of Human-Computer interaction is involved in the construction of interactive systems that are user-centered, in a process vision typically associated with technical knowledge. They also point out that the good usability of a computerized system (whether explicitly directed to the retrieval of information or not) will depend on its harmonious relationship with the context of its operation, with the adequacy of the tasks to be performed by the users and their profile.

For Machado, Vianna e Matias (2020), usability is a sub-area of ergonomics that has as one of its purposes to evaluate human experience in the use of technological systems. They also add that in the field of information science, the intention of usability is to evaluate systems for the recovery of information from the user's point of view and his or her satisfaction in use.

According to Cybis, Betiol e Faust (2010), usability is the quality that characterizes the use of an interactive system, and establishes a relationship among user, task, interface, equipment, and environment in which the user uses the system.

Complying with the NBR ISO 9241-11 Brazilian Association of Technical Standards 2002, usability is defined as "the capacity of a product to be used by specific users to achieve specific objectives with effectiveness, efficiency and satisfaction in a specific context of use". The standard identifies the usability components, namely: users, task, equipment, environment, usage context, products, objectives, effectiveness, efficiency and satisfaction.

It should be emphasized that the standard, in addition to conceptualizing the term usability, brings other definitions to the usability measures identified as efficacy, efficiency and satisfaction.

By efficacy, the standard understands that it is accuracy and completeness with which users achieve their specific purposes.

Whereas regarding efficiency, it deals with how the resources spent in relation to the accuracy and scope with which users achieve their purposes and defines satisfaction as absence of discomfort and presence of positive attitudes toward the use of a product.

Product means that it is part of a piece of equipment (*hardware*, *software*, and material) for which usability is specified or evaluated. It also brings an understanding about the context of use, where the users (person who interacts with the product), the tasks (set of actions necessary to achieve the purpose), the equipment, and the physical and social environment in which a product is used, are verified.

For Cybis, Betiol e Faust (2010) e Nascimento (2006), one of the steps preceding the usability assessment is the analysis of the context of use; it identifies the user's profile, the description of the tasks they perform and the visualization of the physical and organizational environment in which their interactions with the system are processed, through the data collected through the documentary analysis, observation sheets, questionnaires and interviews.

Cybis, Betiol e Faust (2010)reinforce that the construction of a system with usability depends on a diagnosis that involves the various components of its context of use and the user's active participation in the decision-making process, which they understand is a process that portrays the system internal and external qualities.

In this context Nascimento (2006) , points out that the detailed analysis of the organization's data makes it possible to understand its structure and provides the appropriate resources to assist managers in the decision making process. According to the author, in addition to improving the quality and productivity of services and products, this diagnosis allows to acquire knowledge about the user and his or her relation with the information technologies.

From a cost point of view, the detailed analysis takes place in obtaining in detail the costs incurred by the entity over a given period in order to know the organization in terms of the use of its resources and its purposes, that gives managers the opportunity to make decisions based on concrete facts that have occurred.

It is also possible to enhance the methods available for calculating costs for each fiscal year, after knowing the usability of the available technological systems and processing the information necessary to achieve the quality of public spending and its optimization.

## 3 METHODOLOGICAL PROCEDURES

The research took place during the first half of 2020, including data collection and analysis.

SIC is mandatory in all public sector entities, according to item 7 of NBC T 16.11(CFC, 2011b), the research locus (researched environment) incorporates the sectoral and sectional costs of the Federal Government, especially those that make use of TG, totaling 49 costs object-entities.

The subjects of this work are the managers and executors of the sectorial and costs sectional object-entities of the locus or research, which in a first step, a group with a manager profile

participated in the identification of the variables and, in the sequence, another group responded to the data collection form.

NBC T 16.11(CFC, 2011b) also mentions the attributes of cost information such as: relevance, utility, opportunity, social value, trustworthiness, specificity, comparability, adaptability and granularity. The present study aims to research the usability of cost accounting in the Federal Government and has as its assumption the verification of these attributes.

The qualitative variables of this research were obtained through the brainstorming technique. According to Dei Svaldi (2000), this technique was developed in the years 60 at Buffalo University in New York, and it is based on the group's preference to the individual, before a subject proposed to the participants, and on the provision of disinhibition and absence of judgment, and also on the participation of all.

The brainstorming occurred with four participants, working on the theme of costs in the public sector and members of four Federal Government bodies, namely: AGU - 1 Accountant, six years' operating in accounting and costs; Ministry of Science and Technology and Innovation (MCTIC) - 1 Accountant, two years' operating in the area of cost information; STN – 1 Financial and Control Auditor (AFFC), operating for six years; and, EBC – 1 Accountant, operating for five years.

From the brainstorming it was possible to characterize and raise the quality items of the research (criteria and sub-criteria, contribution rate and effort levels of each item), regarding the perception of the usability of the cost systems in the Federal Government. At first, the participation occurred spontaneously on the subject in question, at a second moment, in an induced way in order to obtain the participants' maximum information.

The variables chosen were subsequently checked, analyzed and validated by a focal group composed of six different participants from those who participated in the brainstorming, belonging to four organs of the Federal Executive branch, namely: Ministry of Economics (ME) 1 Accountant, Central Organ Manager, nine years operating in the public sector cost; STN - 2 Accountants, one of them AFFC, both operating for six years; Army Command - 2 Accountants, Planning, Budget and Budget Management, one operating for 20 years and another for 14 years; and EBC- 1 Accountant, Budget and Cost Manager, operating for more than 20 years.

It is important to point out that the operationality of the cost activities in the public sector is usually carried out by accounting professionals, in this sense the participants were Accountants of the respective agencies consulted.

The focal group was responsible for validating the criteria, sub-criteria, rates of contributions and levels of efforts, as well as the approval of descriptors, composed of the following components of the data collection form: basic question "What is your perception about the usability of cost systems in the Federal Government regarding the items listed (sub-criteria)?" and by the attractiveness levels of the 5 (five) answer options "N5 – Very significant, N4 – Significant, N3 – Little significant, N2 – Insignificant and N1 – Poor".

After the Brainstorming and Focal Group stages, an online form was prepared consisting of questions arising from the research criteria and sub-criteria and also socio-demographic issues, in order to find out to which institutions/organs the interviewees belong to and if they have already implemented costs in the entity.

Subsequently, an online form was prepared with the main variables obtained in the brainstorming and validated by the focal group, submitted to the managers and executors of accounting, budget and costs of public sector entities.

According to Nascimento (2006) , in the typology of the current prospective methods, the most used techniques are the interviews of focal groups and the questionnaires that measure the degree of user satisfaction. Nascimento (2006) also mentions that the focal group was created by the sociologist Robert K. Merton, and this is a technique that obtains qualitative data, in which the

participants report their experiences, ideas and correct feelings of the object of discussion. He also adds that the focal groups are more appropriate to identify how a user uses a product.

The research quantitative data were obtained from the application of the multicriteria analysis model for decision support - Constructivist *"Multicriteria Decision Aid - Constructivist"* (MCDA-C). According to Ensslin et al., (2000), MCDA emphasizes the idea of building a problem, that is, it focuses on modeling the decision context based on the consideration of the beliefs and values of the actors involved in the decision-making process, in order to allow the construction of a model on which decisions are based, which is believed to be the most appropriate in the given context.

According to Rodrigues, this method aims to help decision-makers to outline and validate their own values, which makes it possible to understand their problem in depth through an interactive and constructivist process, and also allows them to find a set of solutions, able to assist in decision making in the search for a more satisfactory result.

According to Bana e Costa (1993) , decision-making is first and foremost a human activity, sustained by the notion of value, and that, therefore, subjectivity is omnipresent and is the driving force of decision. This is because, according to the author, a decision-making process is a system of relations among elements of an objective nature, proper to actions and elements of a subjective nature, proper to the systems of the actors' values.

In this study, the frequencies of responses were raised by means of an electronic form and the medians of each item answered were identified.

These data were modeled in a *software* that depicts the MCDA-C methodology, called MyMCDA-C, developed at Universidade de Brasilia (UnB), where the following data were released: research object, medians of the responses of the data collection form, criteria, sub-criteria, contribution rates, effort levels and descriptors.

The mathematical modeling used in this research is the construction of weighted averages based on contribution rates and responses of the interviewees. The formula in Figure 1 depicts the calculations to obtain the final value of the performance of the analyzed criterion.

$$Vg(a)=W1V1(a) + W2V2(a) + W3V3(a)+\ldots. +WnVn(a) \quad (1)$$

Or

$$Vg(a) = \sum_{i}^{n} w1v1(a) \quad (2)$$

**Figure 1.** Global Performance Value
Source: Adapted from Rodrigues et al. (2015)

Where: VG(a) = Total or Final or Global Value of the Performance of the potential action 'a';
Wi = Contribution Rate corresponding to criterion (PVF i), i = 1, 2, ..., n;
VI = partial value of a potential action 'a' in criterion í, i = 1, 2, ..., n.

In a practical application of the formula, for example, the data from the first search criterion, where the following results were obtained:

Table 1
**Formula Practical Application**

| Criterion | Sub-criterion | Median | Tx Cont (%) |
|---|---|---|---|
| 1 COST ESTABLISHMENT | 1.1 Cost x Benefit for cost establishment | N5 = 180 | 30 |
| | 1.2 Federal Government Cost Portal | N4 = 100 | 10 |
| | 1.3 Establishment of pilot test | N5 = 180 | 10 |
| | 1.4 High Management support and feedback | N5 = 180 | 50 |

Where: N5 = Very Significant and N4 = Significant
Source: Author (Sample Result)

Thus, the Performance Global Value of the criterion "Cost Establishment" would be represented by the following data in the formula:

$$Vg\ (a) = 180 \times 0.30 + 100 \times 0.10 + 180 \times 0.10 + 180 \times 0.50 = 173$$

The result of VG(a) = "173" will be compared with the maximum points and minimum points indicated by the *software* according to the level of effort of each sub criterion and, later, it will be compared with the results of the other criteria for the analysis of the optimal point and usability.

The modeling software, which is formulated based on the MCDA-C methodology, allows the generation of charts and tables for each criterion and research object, with the possibility of analyzes in various contexts.

## 4 RESULTS

### 4.1 CONTRIBUTIONS ACHIEVED

The brainstorming stage with the four members of public bodies of the Federal Executive Power was fundamental for the survey of useful and relevant quality items in the researched theme.

The participants contributed with 51 (fifty-one) sub criteria and 9 (nine) criteria on the perception of the cost systems usability in the federal public sector.

Subsequently, a refinement of the sub-criteria was carried out to align with the theme and reduced to 37 sub-criteria.

The selected criteria were: 1) Cost Establishment, 2) Cost Methodology, 3) Technological Tools, 4) Cost Users, 5) Ease of Use, 6) Information Generation, 7) Cost Information Attributes, 8) Cost Information Usefulness, and 9) Relevance of Cost Information.

### 4.2 Results from a Precise Point of View

The focal group was composed of 06 (six) members, members of the Federal Executive Branch and with extensive experience in the theme of costs in the public sector.

The results were satisfactory, in principle, there was a reduction of 1 sub criterion, then from 37 to 36 sub criteria, and maintaining the criteria already defined by the participants in the brainstorming.

The authors presented suggestions regarding contribution rates, effort levels and descriptors (baseline question and response attractiveness levels). The focal group altered these suggestions predominantly in the effort levels and contribution rates in the criteria: 2 – Cost Methodology, 5 – Ease of Use, 6 – Information Generation, 7 – Cost Information Attributes and 8 – Cost Information Utilities.

As for the levels of effort, the suggested changes prioritized the criteria: 6 – Information Generation and 8 – Cost Information Usefulness

Other contributions such as changing the terms of the sub-criteria to better portray the research object were also given by the focal group. The intention was to make it clear what would be requested in the form to be drawn up.

### 4.3 Analysis of the User Perception

34 responses were received from the online form forwarded to managers and executors who deal with accounting, budget and costs activities of the organs and entities of the Federal Executive Branch on a daily basis.

Of these 34, 31 responses were validated and 03 invalidated due to the same response to all the available options (02 Responses) and the respondent for having less than 1 year of performance (01 response). Therefore, only the 31 (thirty-one) respondents will be considered for the present study, based on valid responses.

Table 2 presents the information obtained initially generated in the brainstorming and consolidated in the focal group, also from medians (C3) based on the responses of the application of the data collection form.

Table 2
**Formula Practical Application**

WHAT IS YOUR PERCEPTION ABOUT THE COST SYSTEMS USABILITY IN THE FEDERAL GOVERNMENT?

**N5 = Very Significant N4 = Significant N3 = Little Significant N2 = Insignificant N1 = Poor**

| A = CRITERIA | | | | B = SUB-CRITERIA | | C = RESULTS | | |
|---|---|---|---|---|---|---|---|---|
| Results | | C1 | C2 | | | C1 | C2 | C3 |
| 1 | COST ESTABLISHMENT | 10% | 7 | 1.1 | Cost x Benefit for cost establishment | 30% | 23 | N5 |
| | | | | 1.2 | Federal Government Cost Portal | 10% | 24 | N4 |
| | | | | 1.3 | Establishment of pilot test | 10% | 33 | N5 |
| | | | | 1.4 | High Management support and feedback | 50% | 22 | N5 |
| 2 | COST METHODOLOGY | 10% | 1 | 2.1 | Reconciliation of Costs and Budget | 20% | 3 | N4 |
| | | | | 2.2 | Value Chain Identification (Products/Services/Processes/Organizational Units/Nature of Expense) | 40% | 1 | N4 |
| | | | | 2.3 | Standardization of Cost Information between organizational units | 10% | 4 | N5 |
| | | | | 2.4 | Appropriation of Direct Costs and Treatment of Indirect Costs by means of Criteria of Apportionment | 20% | 2 | N5 |
| | | | | 2.5 | Audit in cost data to check error rates in releases | 10% | 27 | N5 |
| 3 | TECHNOLOGY TOOLS | 10% | 9 | 3.1 | Management Treasury (Cost Information System - SIC) | 50% | 26 | N5 |
| | | | | 3.2 | Business Intelligence - BI (e.g. Microsoft Power BI, Qlik View) | 40% | 36 | N4 |
| | | | | 3.3 | Filter Tools and Applications (e.g. Excel; Google Spreadsheets, DAAS Quartzo SERPRO) | 10% | 35 | N4 |
| 4 | COST USERS | 10% | 8 | 4.1 | Training and qualification for consulting the cost information | 40% | 25 | N5 |
| | | | | 4.2 | Knowledge of Cost concepts and search for cost information | 60% | 34 | N5 |
| 5 | EASE OF USE | 10% | 4 | 5.1 | Creation of Cost Manual in the Entity | 30% | 30 | N5 |
| | | | | 5.2 | Expense Object Identification for Classification | 50% | 12 | N5 |
| | | | | 5.3 | Entries in cost centers | 20% | 13 | N5 |
| 6 | GENERATION OF INFORMATION | 10% | 5 | 6.1 | Cost Center Pointing by the Cost Sector (Support Point) | 20% | 21 | N5 |
| | | | | 6.2 | Contracts Inspector Support to the Cost Sector | 15% | 15 | N4 |
| | | | | 6.3 | Cost Center Classification in the Cost Manual | 10% | 31 | N5 |
| | | | | 6.4 | Cost Center entered by the Cost System itself | 30% | 14 | N4 |
| | | | | 6.5 | System allows to correct errors, cross-check data, and generate dynamic reports and data conferencing | 15% | 19 | N5 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | 6.6 | Costs Panels are detailed by expense object, units, products, processes (personnel expenses and administrative expenses) | 10% | 20 | N5 |
| **7** | **COST INFORMATION ATTRIBUTES** | **10%** | **6** | 7.1 | Cost information is timely | 25% | 17 | N5 |
| | | | | 7.2 | Cost information meets the specific features intended by users | 35% | 18 | N5 |
| | | | | 7.3 | Cost information understandable by the manager | 20% | 16 | N5 |
| | | | | 7.4 | Disclosure and Transparency on the entity's website | 20% | 32 | N5 |
| **8** | **COST INFORMATION USEFULNESS** | **15%** | **2** | 8.1 | Costs usefulness by managers | 40% | 5 | N5 |
| | | | | 8.2 | Creation of indicators for Costs monitoring | 20% | 8 | N5 |
| | | | | 8.3 | Identification of the costs of the units, products, services, processes and the measurements used | 20% | 6 | N4 |
| | | | | 8.4 | Costs of Contracts consumed in the proposed aims | 10% | 7 | N4 |
| | | | | 8.5 | Costs use of with budget and financial information bias | 10% | 28 | N4 |
| **9** | **COST INFORMATION RELEVANCE** | **15%** | **3** | 9.1 | Costs Basis for making decisions | 40% | 10 | N5 |
| | | | | 9.2 | Subsidy to the elaboration of the proposal of the Annual Budget Law - PLOA / Strategic Planning | 30% | 9 | N4 |
| | | | | 9.3 | Subsidy for the data collection for reports of the organs of controls and sectoral bodies | 20% | 11 | N5 |
| | | | | 9.4 | Subsidies for internal studies (Example Did teleworking during the pandemic bring reduction to the entity?) | 10% | 29 | N5 |

Where: C1 = Contribution Rate, C2 = Effort Levels (general) and C3 = Median
Source: Research Data.

The results were tabulated with the median indicative as a final response for the mathematical modeling to be used in the MyMCDA-D *software*, which are detailed in Table 2, demonstrating that the majority of users realized that the proposed criteria regarding usability in the governmental cost systems were very significant.

Furthermore, the results N5 – Very Significant and N4 – Significant described in the research corroborate the understanding that Cybis, Betiol e Faust (2010) when mentioning that the construction of a system with usability depends on a diagnosis that involves the various components of its context of use and the user active participation in the decision-making process, it is realized that the criteria and sub-criteria exposed in the research will meet the complexity of the cost systems in the Federal Government.

Users' perception was in agreement to the understanding of Machado, Vianna e Matias (2020) when they reported that the purpose of usability is to evaluate systems for the recovery of information from the user's point of view and their satisfaction in use, therefore, the optimal view was reached on all the proposed items.

The favorable result of the research confirms the understanding of Machado e Holanda (2010), by mentioning that it is fundamental that users perceive the usefulness of cost information for the management control and improvement of their activities and improvement of the decision process. The criteria and sub-criteria listed in the research go in this direction, if applied in most cases, can contribute to the perception of the costs utility, because they contain elements that provide the generation of useful and relevant cost information to the public manager.

### *4.3.1 Analysis of Sociodemographic Data*

In order to identify the respondents' socioeconomic profile, the following questions were presented to ratify the respondents' adherence to the purpose of the research: i) which organ they work, ii) how long they have worked in the area of costs, and iii) situation of cost implantation in the organ. Thus, according to the answers of the sociodemographic questions listed in the questionnaire, 100% of the respondents are active in the Executive Branch, therefore, within the proposal of the research object.

45% of the respondents come from local Autonomous Entities, as Figure 2 shows.


**Figure 2.** Direct and Indirect Public Administration
Source: Research Data.

The largest share of respondents has between 1 to 5 years of performance and 13% (thirteen percent) have over 20 years of performance (see Figure 3), therefore, they are in line with the research desired profile, as well as with the profile of the brainstorming participants and focal group.

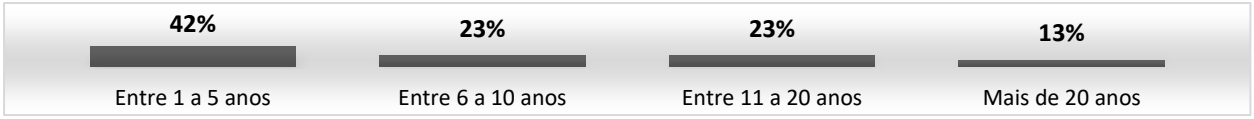



**Figure 3.** Performance Time
Source: Research Data.

The sociodemographic results of the research also demonstrated that 74% of respondents work in organs/entities that have already implemented costs or are in the implementation phase, which reinforces the user's perception of the proposed theme, see Figure 4, also pointing out that only 6% of the entities have not had yet, interest in establishing costs.

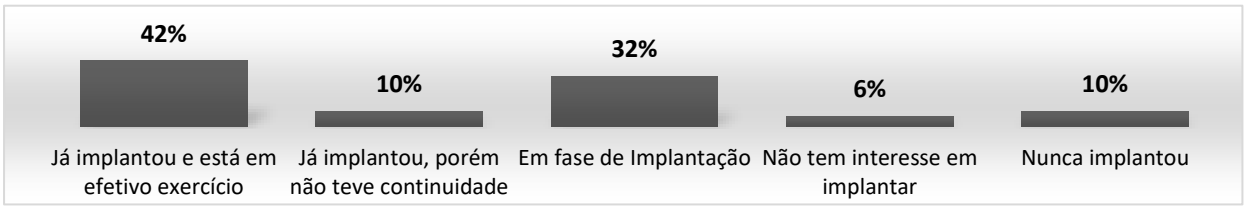



**Figure 4.** Costs Establishment in the Entity/Organ
Source: Research Data

*4.3.2 Analysis of Cost Systems Usability Criteria and Sub-Criteria in MyMCDA-C Software*

After entering the data of the qualitative and quantitative variables of this research (see Table 2) in the MyMCDA-C *software*, the charts and metrics were obtained with the results regarding the usability perception of the public sector costs by the users at their maximum point and at their minimum point, which were pointed out by the system after the mention of the levels of effort and contribution rates of each criterion and sub criterion.

According to the multi-criteria analysis (MCDA-C), the level of effort refers to every effort employed by the entity/organ manager capable of changing a situation from negative to positive, whether using financial or non-financial resources, logistical resources or any other nature.

In this sense, the longer the interval between the maximum and the minimum level, it means that the path to be traveled is greater, or the investment to achieve the optimal result is greater (Braga et al., 2016).

To demonstrate the overall results of this research, Chart 4 – Performance of the Criteria and Sub-criteria was selected, where all criteria are included. It is noteworthy that the result of the effort level of each criterion is perceived by the sum of the degrees between the maximum line (blue) and the minimum line (orange).

The results of the research pointed out that the criterion that demands a higher level of effort is item 2 – Cost Methodology, with 490 degrees (-195 until 295), therefore, it confirms the understanding of Padrones, Santos and Colares (2017), Monteiro (2018) and Santos and Voese (2019) regarding the difficulties of establishing cost system in public administration. When viewing the sub criteria listed in Table 2, the managerial effort that is demanded of the manager to reverse the situation is found to be negative to make it positive, and this effort is primarily spent on the identification of the entity value chain and on the treatment of the entity's indirect costs to make the information *useful to* the manager's usability.

In this sense, the understanding of Cybis, Beltiol and Faust (2010) and Nascimento (2006) reinforces when they mention the level of effort that is being made in the analysis of the context of use, when identifying the user's profile, the tasks description they perform and the visualization of the physical and organizational environment where the interactions with the system are processed, facts contained in the organ cost methodology.

On the other hand, the lowest level of effort occurred in item 3 – Technology Tools, with only 174 degrees (-37 until 137), ratifying the recommendations of NBC T 16.11 as for the use of tools that allow fast access to data, combined with database technologies in order to facilitate the creation of reports and data analysis, and therefore, through the free access to SIC by STN to public sector bodies and entities, as well as the use of other tools, as pointed out by Santos and Voese (2019) when pointing out that some agencies make use of third-party ERP, spreadsheets of calculations and their own systems in their cost-calculation projects. Therefore, the technology tools are available for use and are easier to reverse the usability situation on the part of the manager.

Figure 5 also shows that the Global Performance Value of the criteria is represented in the actual performance line (pink) according to the values described in the item "UsabiCustos Real", derived from the median extraction of the responses obtained in the research, measuring the user's perception of the cost systems usability in each criterion.

All criteria are understood within the optimal points and are considered expected results, since they are above the zero line, which legitimizes the findings of Machado, Vianna e Matias (2020) pointing out that the intent of usability is to evaluate information retrieval systems from the user's point of view and their satisfaction in use.

- **Criteria with Achievement of Excellence**

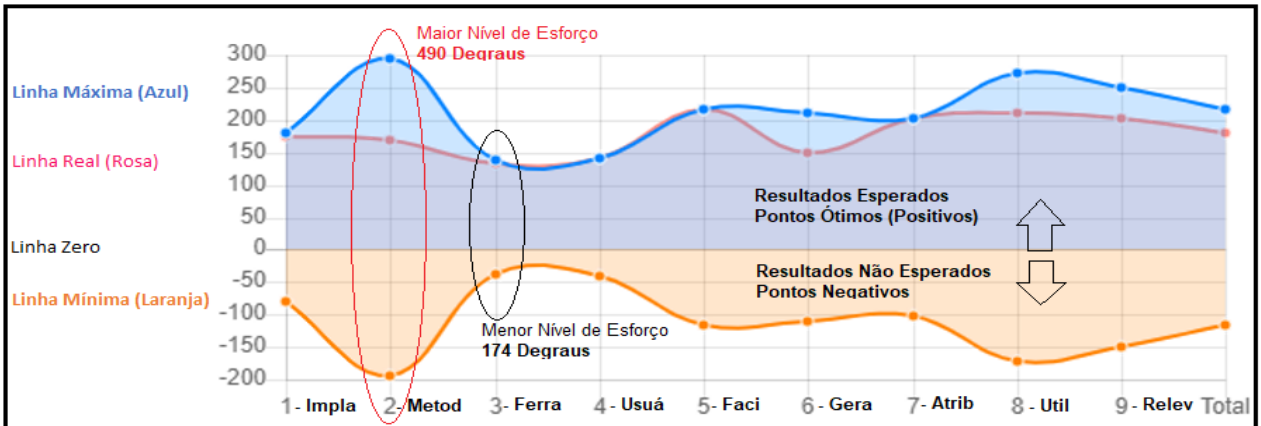
The criteria that achieved the level of excellence for the best performance to support decision in user perception were: Item 4 – "Cost Users" (140), item 5 – "Ease of Use" (216) and item 7 – "Cost Information Attributes" (201). In this sense, the results of the research were evaluated significantly, providing a final result within the optimal points and at the maximum level of usability.

Regarding item 4 – "Cost users", this excellence is achieved when users are trained, qualified and with broad knowledge of cost concepts, (see Table 2), allowing the use and interaction with cost systems effectively and efficiently, confirming the concepts of the NBR ISO 92471-11 Standard (2002) when referring to the term usability measures.

The optimal point of item 5 – "Use of Use" was achieved due to the perception of respondents regarding usability in the presence of a cost manual in the entity, with information suitable for their identification of the expense object, ready for its full release (see Table 2). Therefore, it reaffirms the understanding of Nielsen (2012) in reporting that usability refers to methods to improve ease of use during the design process, being present in any degree of the user experience.

Item 7 - "Cost Information Attributes", portrayed in the research with some qualitative elements such as timing and understandability, as well as characteristics such as specificity demanded by users and disclosure and transparency of information, demonstrates the obligation to present information to users with the qualitative characteristics listed by NBC TSP, as well as

with the precepts of NBC T 16.11, which deals with the public sector cost information system, by mentioning that several legal devices determine the costs calculation in the public sector as requirements for transparency and accountability to users of internal control, external control or social control.




| | 1 - Impla | 2 - Metod | 3 - Ferra | 4 - Usuá | 5 - Faci | 6 - Gera | 7 - Atrib | 8 - Util | 9 - Relev | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| UsabiCustos Max | 180 | 295 | 137 | 140 | 216 | 210 | 201 | 272 | 251 | 216 |
| UsabiCustos Real | 173 | 168 | 133 | 140 | 216 | 149 | 201 | 212 | 201 | 180 |
| UsabiCustos Min | -80 | -195 | -37 | -40 | -116 | -110 | -101 | -172 | -151 | -116 |

| Critérios | UsabiCustos Máximo | UsabiCustos Real | UsabiCustos Mínimo | Taxa de Contribuição | Níveis de Esforço |
|---|---|---|---|---|---|
| 1 - IMPLANTAÇÃO DE CUSTOS | 180 | 173 | -80 | 10 | 7º |
| 2 - METODOLOGIA DE CUSTOS | 295 | 168 | -195 | 10 | 1º |
| 3- FERRAMENTAS TECNOLÓGICAS | 137 | 133 | -37 | 10 | 9º |
| 4 - USUÁRIOS DE CUSTOS | 140 | 140 | -40 | 10 | 8º |
| 5 - FACILIDADES DE USO | 216 | 216 | -116 | 10 | 4º |
| 6 - GERAÇÃO DE INFORMAÇÕES | 210 | 149 | -110 | 10 | 5º |
| 7 - ATRIBUTOS DA INFORMAÇÃO DE CUSTOS | 201 | 201 | -101 | 10 | 6ª |
| 8 - UTILIDADE DAS INFORMAÇÕES DE CUSTOS | 272 | 212 | -172 | 15 | 2ª |
| 9 - RELEVÂNCIA DAS INFORMAÇÕES DE CUSTOS | 251 | 201 | -151 | 15 | 3ª |
| TOTAL | 216 | 180 | -116 | 100 | - |

**Figure 5.** Criteria and Sub-criteria Performance
Source: Adapted from the MyMCDA *Software*, based on the Research data.

The "Cost Information Attributes" criterion also confirms the understanding of Machado e Holanda (2010) upon mentioning that SIC generates information comparable to all federal public administration, making it useful for evaluating performance and results of public policies.

- **Criteria with Performance close to that of Excellence**

When analyzing the criteria 1 and 3, it can be seen that criterion 1 – "Cost Establishment" presented an optimal point (173), close to the maximum effort level (180), therefore, only 7 degrees (173 to 180), this means that this item will require the lowest efforts to reach the level of excellence in support of the decision, which corroborates the understanding of Padrones, Santos e Colares (2017), Monteiro (2018) and Santos e Voese (2019), as, their studies prove that there are still significant difficulties in implementing the cost system in public administration. This fact also occurred with the criterion: 3 – "Technology Tools" (4 degrees, from 133 to 137).

Item 3 – "Technological Tools" confirms the understanding of Machado, Vianna e Matias (2020) by reporting that the technology is imbricated in several social, economic and governmental segments, being responsible for supporting the various work and production processes, as well as influencing trends in everyday life.

- **Criteria with the Highest Contribution Rates**

The criteria that indicated the highest contribution rates are item 8 – "Cost Information Usefulness" and item 9 – "Cost Information Relevance", both with 15% of contribution rates.

Item 8 – "Cost Information Usefulness", concerning the search for the cost information usefulness by the manager and the identification of units costs, products, services, processes, as well as indicators for the follow-up of costs was portrayed in the research as very significant.

Therefore it corroborates with the understanding of Machado e Holanda (2010) when mentioning some purposes of cost information, such as: to subsidize the planning and budgeting process, to support management decisions, to evaluate certain goods or services produced by the government, and to make the information generated useful and appropriate to the decision-making process, as well as to facilitate the manager's task in aiming to maximize the results of public resources.

It also corroborates the understanding of Verbeeten (2011) , when mentioning that cost information is used globally for planning, budgeting, pricing, evaluation, and government performance control.

Regarding item 9 – "Cost Information Relevance", it is noteworthy that this criterion is consistent with the understandings of Machado and Holanda (2010), Martins and Rocha (2015), Machado, Holanda and Bezerra Filho (2018), Silva (2017) and Elias (2017), when reporting that cost accounting is responsible for measuring an entity's costs, and that it has the purpose of having information that makes decision making possible, highlighting the value of cost information for management purposes, and for being of great relevance to the public interest, as well as to transparency and accountability, whether for external control, internal control or social control.

- **Criteria with the Highest Levels of Effort to Achieve Excellence**

The criteria that need to climb further degrees to achieve the highest possible level of performance, considering the effort for each criterion to leave the actual position (Royal Line – Pink) at which it is up to the maximum point (Maximum Line – Blue) were: Item 2 – "Cost Methodology" with 127 degrees (168 to 295) and Item 6 – "Information Generation" with 61 degrees.

Among all the criteria of this research, "2- Cost Methodology" is the criterion that, in addition to demanding effort, demands the greatest investment to reach excellence, justifying the understanding of Padrones, Santos e Colares (2017) by mentioning that the STN has made changes in accounting standardization to be in line with the international standards applied to the public sector, leaving from the budget control bias to meet the object of public accounting, not only for compliance with legislation but also as an auxiliary decision-making tool.

The investment spent in "Cost Methodology" matches the reports of Souza et al. (2017) by performing *benchmarking* in public bodies and entities, meetings with internal teams, searching for concepts and guidelines with technical bodies, participation in congresses, seminars, symposia and cost meetings in the public sector to consolidate the cost model and make it available and accessible to users.

As for item 6 – "Information Generation", it demands more investment in carrying out survey of information, entries, classifications, processing of cost data and presentation in control panels, agreeing with Machado, Holanda e Bezerra Filho (2018) upon mentioning that it is necessary to implement a mechanism for evaluation of results and performance in the public sector based on cost information, leading to improved management.

- **Total or Final Performance of Cost Systems Usability**

The performance of the total cost systems usability was 180 on a scale of [-116, 216]. This demonstrates that the use of usability concepts in cost systems, focused on investigations in user interactions (public manager) and costs, from interfaces, applications and cost systems in the public sector, has come close to the degree of excellence. When considering the scale, which shows the result 180, which achieved performance from the lowest position "-116" to 180 positive, it totaled the "296" degrees path, in a maximum number of degrees to be taken of "332", therefore, the performance achieved corresponds to 89.16%.

## 5 CONCLUSION

The absence of studies on usability issues in the area of accounting sciences is observed, therefore, the work aimed to address the terminology of usability in the context of the federal public sector cost systems, considering it to be a contribution of improvement from the point of view of the accounting tools analysis.

In this sense, the objective of the research was to analyze the usability perception of the Federal Public sector cost systems by the managers and users of the cost information, reaching a positive result of 180, on a scale of [-116, 216], which indicates the need to climb another 36 degrees to achieve excellence.

The results showed that all the criteria submitted reached the expected results (optimal points), that is, they were in accordance with the proposal of an excellent level of usability, which were considered in the majority to be very significant for achieving the use objectives of the cost systems.

The greatest effort on the part of the managers was perceived in criterion 2 “cost methodology”, while the lowest effort was for criterion 3 “technology tools”, both consistent with the methodological approach. In practical terms, it was evident that the effort to seek a cost methodology relevant to the agency's objectives is greater than the technological tools currently available.

The criteria that presented a level of excellence regarding the best performance for decision support were: cost user, ease of use, and cost information attributes, which reached the maximum level of usability.

Finally, the cost-related usability criteria presented in this study, in addition to adding to the bibliographic basis for future studies, aim to subsidize the costs establishment in the entity/organ, with a view to having a better ease of use and appropriation by its users, since they were suggested, analyzed and validated by relevant experts and users acting on the theme of costs in the public sector.

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