Integrated Governance and Management Index (iGG) of the Federal Court of Auditors (TCU): Quality of Governance and Public Management – Technological Innovation Index

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Abstract

To describe the Integrated Governance and Management Index (iGG) used by the Federal Court of Auditors (TCU) by discussing the relevance of its applicability for improving the quality of public management in Brazil. The reports issued by the governance evaluations conducted by the TCU from 2007 to 2019 were examined. The analyses showed that the process of constitution of the current iGG proceeded to the creation of different evaluation indices that were later gathered to constitute and configure the current iGG. The results showed that iGG has significantly contributed to improving the quality of public management in Brazil in view of the growth of the index values pointed out in its reports. Finally, the study suggests the iGG process can be considered a technological innovation, based on the Organization for Economic Cooperation and Development (OECD) concept.

Keywords: iGG; Public Governance; Public Management; Technological Innovation.

1 Introduction

In Brazil, the collective body of the federal government that functions as an external control (inspection) of the financial, accounting, budgetary, operational and patrimonial resources of public institutions throughout the country is the Federal Court of Accounts (TCU). The TCU was legalized in the Federal Constitution of 1988, specifically in articles 33, §2; 70; 71; 72, §1; 74, §2; and 161, sole paragraph. In addition to its main function as a supervisory body, it is part of the TCU's mission to contribute to the improvement and quality of public administration in the country (Loureiro; Teixeira; Moraes, 2009).

Before evaluating the quality of governance and management it is necessary to understand what these terms mean to each government body or institution involved. This understanding becomes difficult because the words governance and management are sometimes used interchangeably in literature. Carneiro and Menicucci (2013), and Dias and Cario (2014) discuss the differentiation regarding what is governance, democratic governance, participatory governance and public governance:

In the context of current trends and proposals, the term governance also resignifies itself, ceasing to refer to the format of state-society relations or the public and private sector in the production of public goods and services, with a view to greater efficiency in referring to proposals of democratic deepening. In the latter sense, governance is related to the participation of members of society in broader decision-making processes and in public management. Democratic or participatory governance thus involves the constitution of democratic and deliberative mechanisms as a way to correct democratic deficits and ensure accountability. (Carneiro; Menicucci, 2013).

what is called Public Governance – a developmental strategy adopted in the relationship between the State and society with a view of building what is public, involving the public itself and seeking to meet the interests of that same public. In other words, governance that uses more democratic processes to design the solutions demanded by 21st century society. (Dias; Cario, 2014, p. 93)

This study followed the concept of Dias and Cario (2014) on public governance and adopts the definition of Oliveira, Correia and Alves (2017) on public management:

Public management and public administration are concepts that are confused in their characteristics; however, public management is linked to the administration mandate, i.e., it refers to the management of public affairs in a certain period of time with the duty to defend, preserve and improve public goods, services and interests (Oliveira; Correia; Alves, 2017, p. 92)

One of the instruments created by the TCU to improve the quality of governance and management of public administration in Brazil is the so-called Integrated Governance and Management Index (iGG). iGG is an indicator of the level of governance and management of public organizations in Brazil. It is an important indicator of the quality of government and management effectiveness in the country. Through iGG, the TCU and other bodies of different natures can be oriented to the improvement of the final activities of each body. (Brasil, 2018b)

Public management in Brazil faces serious problems of structuring, human and financial resources, equipment, and political interventions, among many others. (Motta, 2007) (Ribeiro; Pereira; Benedicto, 2013). In this context, governance and management capacity is hampered because there is a lack of contributions of all kinds to sustain quality management. It is urgent to monitor, control, evaluate and analyze the quality of public organizations' governance and management in the country, as a way to raise alternatives to improve this context. (Oliveira; Pisa, 2015).

The problems of public management in Brazil mentioned by Motta (2007) and Ribeiro et al. (2013), besides the urgency indicated by Oliveira and Pisa (2015), contextualize the problem that motivated this study: what characterizes iGG and what is the importance of its implementation to improve the quality of public management in Brazil?

The general objective of this research is to describe iGG used by the TCU discussing the relevance of its applicability for improving the quality of public management in Brazil. The study is justified since improving the quality of public management would mean the possibility of greater provision of quality services to the citizen.

To achieve the general objective of the research, three specific objectives were developed:

a) To describe iGG as used by the Federal Court of Auditors – TCU/Brazil, highlighting its origin;

b) To describe iGG as used by the Federal Court of Auditors – TCU/Brazil, highlighting its evolution;

c) To associate the importance of the application of iGG in organizations to improve the quality of public management in Brazil.

This study was structured as follows. In addition to this introduction, the second part indicates the methodology used. The third part brings the results of the descriptive data on what constitutes iGG and the context that originated it. The fourth part discusses iGG's contribution to governance and management. Finally, the last part presents the final considerations on the limitations of the study, as well as suggestions for improvements and future research to complement the studied scope.

2 Methodology

As for its nature, this study reveals an applied research. The approach to the problem indicates qualitative research structure and the method is phenomenological. The set of objectives outline a descriptive research and, in relation to the procedures of investigation, it is documental. The data collection is of secondary nature. The bibliographic referential of data analysis refers to the literature on governance and public management. And the unit of analysis is iGG of the TCU, as a tool for evaluating the quality of governance and public management in Brazil, from 2006 to 2019.

To achieve the objective of this research, data were collected from the official TCU website, following TCU authored documents:

Chart 1 – Governance and Management Evaluation Dossier (iGG) – Financial Year 2007

Financial Year	Index	Title of the document link on the TCU website	Content Discrimination of the researchers
2007	iGovTI	Informative	Information Technology (IT) Governance What it is – Why – Objectives
		Governance IT Profile 2007- Help	Detailed instructions for each of the 39 questions in the questionnaire
		Governance IT Profile 2007 – Survey questions	Total of 39 questionnaire questions
		Governance IT Profile 2007– Presentation of Questionnaire	Instructions for completing the questionnaire (1 page)
		Report, vote and decision 1603/2008	Complete report iGovTI 2007 TC-008.3802007-1 (with 9 attachments) OBS: Do not present the disclosed attachments.
		Executive summary	Book of the full evaluation report of iGovTI 2007, authored by TCU, published in 2008.2007, authored by TCU, and published in 2008.
Main site: https://portal.tcu.gov.br/tecnologia-da-informacao/ Main sub-site: https://portal.tcu.gov.br/fiscalizacao-de-tecnologia-da-informacao/atuacao/perfil-de-governanca-de-ti/ The two URLs presented in this chart constitute the first two levels of the electronic address hierarchy from which data were collected. Many files accessed were up to five levels on hierarchy.			

Source: the author

Similar charts were prepared for the years 2010, 2012, 2014, 2016 and 2018. The TCU published in its official page the non-accomplishment of the evaluation of the governance and management in the exercise 2019[i].

After reading the data available in the different types of documents described in Chart 1 and made available on the official website of the TCU, data were gathered and information systematized in

chronological order to clarify the sequence and functioning rules of iGG. The results are shown in the next part.

3 Results

3.1 iGG – Origin, evolution and description

Since 2006, the origin of iGG in 2017 has evolved through a long path, characterized by improvements. Inattentive readings may confuse iGG with different acronyms found in texts that quote it. Such confusion is due to the fact that iGG originates from one of the indices that currently constitute it, namely, the Index of Governance in Information Technology Management (iGovTI). The TCU started with the iGovTI in 2007, and then used the General Governance Index (IGG) from 2010 on, but it was in 2018 that it assumed iGG identity. It is worth mentioning that in 2014 the report TC 020.830/2014-9 of TCU brought the "Public Governance Index," as the title of one of its sections. The fact that, for each type of survey, the TCU adopted differentiated indices corroborates such variation. Example: the General Index of Simplified Governance – iGGs (Brasil, 2014, p. 13). A quick clarification of iGG evolution follows.

In 2006, the TCU created the Secretariat for Information Technology Inspection (SEFTI). SEFTI was created aiming at the strategic dimension of information technology (IT). The growth in the purchase of IT material by public agencies, the denunciations about irregularities on these purchases, besides being a complex area regarding management, also constituted driving elements for TCU to think about the creation of SEFTI. (Brasil, 2008; Cunha; Souza Neto, 2014)

SEFTI's main function was to supervise the public resources destined to application in IT and propose actions to improve IT governance. In order to know the reality of the federal public administration related to the IT area, SEFTI had to perform, as its first task, a diagnosis of the existing structure and management. (BRASIL, 2008) In 2007, this action was authorized by Decision 435/207-TCU-full court. This agreement would initiate what would later trigger a series of historic agreements aimed at evaluating the governance and management of Brazilian public bodies: Decision 3023/2013; Decision number 1273/2015-TCU-full court; Decision number 2238/2016-TCU-full court; Decision number 882/2017– TCU-full court; Decision number 2699/2018-TCU-full court; Decision number 588/2018-TCU-full court; Decision number 741/2018-TCU-full court and many others.

Still in 2007 the survey on IT governance produced important results, but did not generate a specific indicator. In 2010 there was a suggestion for adoption of an indicator to give greater security and transparency to the procedures:

TCU has been conducting governance surveys since 2007, initially in the IT area, currently covering several areas. The calculation for the governance indicator was proposed in the 2010 survey. Since then it has become a widely disseminated and discussed reference for governance practices of public organizations. (Brasil, 2014, p. 13)

The production of important information on IT governance in 2007 encouraged the continuation of the survey in the following years (2008; 2010; 2012; 2014; 2016). While the other evaluations were being conducted, the survey was extended to other areas: personnel management (2012/2013), acquisition

management – purchasing (2013/2014). The information coming from these surveys evidenced difficulties that the agencies went through, highlighting the need of the TCU to better understand its causes in order to suggest alternatives to improve the situation presented. The TCU itself reports:

However, the refinement of the survey procedures and analysis of governance in information technology (2007/2008, 2010, 2012 and 2014), in personnel (2012/2013) and in acquisitions (2013/2014) highlighted the need to deepen the studies on factors that could better explain the failures of governance in these areas. (Brasil, 2014, p. 13)

In 2012 the TCU took an effective stance on improving public governance in Brazil, becoming a reference for the organizations that it provided guidance (Brasil, 2017). In March 2013 the TCU developed a governance model for itself and, based on it, elaborated a general model of public governance that contemplated municipal, state and federal spheres. (Brasil, 2014). As the reality of governance in Brazil became known, many actions related to these evaluations were modified from 2007 to 2013, which was possible by the data collected in the diagnoses.

A total of 255 institutions participated in the first IT governance evaluation survey, conducted in 2007. It was not necessary to print the respective questionnaire, and the evaluated institutions should only use the browser, via password, sent to each participating agency. The Risk Manager software was used to send, collect and tabulate the questionnaire data:

39 questions based on Brazilian technical standards NBR ISO/IEC 17799:2005, NBR ISO/IEC 15999-1:2007 and Control Objectives for Information and related Technology 4.1 (Cobit 4.1). NBR ISO/IEC 17799:2005 is the most adopted code of practice for information security management worldwide. This standard had its first version internalized by the Brazilian Association of Technical Standards (ABNT) in September 2001. (Brasil, 2008, p. 9)
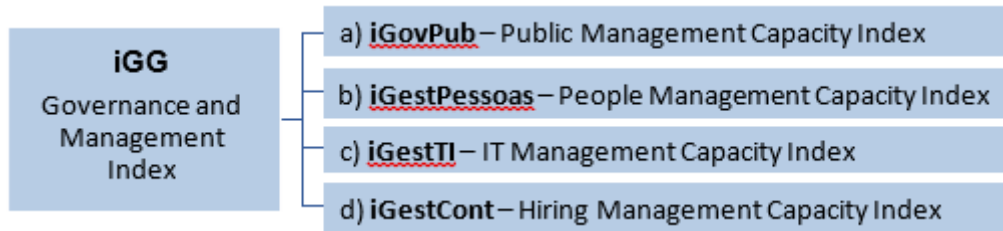
In the second version of the IT governance evaluation, the questionnaire consisted of 152 items (Brasil, 2010) and, from that, the TCU began to adopt a management indicator index to map IT governance and turned governance control into a routine. The "IT Governance Index (iGovTI) was created from the combination of three benchmarks: a) Cobit 4.1, an IT governance evaluation parameter used worldwide (ITGI, 2007); b) the "Gespública," a public management model program, considered of excellence and adopted in Brazil; and c) Decision number 1603/2008 – TCU – Full court, which brought the results of the first governance evaluation conducted in 2007.

As mentioned before, the TCU continued the IT governance capacity evaluations, as well as extended it to different segments:
    a) in IT – 2007/2008; 2010; 2012; 2014; 2016.
    b) in personnel – 2012/2013 (Decision 3.023/2013)
    c) in acquisitions – 2013/2014 (TC 025,068/2013-0.)
    However, it was from 2017 on that such indices were joined as a more comprehensive form of governance and management evaluation. (BRASIL, 2018b). iGG is currently constituted of four other indicators, including iGovTI, which appears in Decision number 2699/2018 – TCU – Full court with another nomenclature: iGestTI. Namely:

Image 1 – Composition of the Governance and Management Index (iGG)

iGG Governance and Management Index	a) **iGovPub** – Public Management Capacity Index
	b) **iGestPessoas** – People Management Capacity Index
	c) **iGestTI** – IT Management Capacity Index
	d) **iGestCont** – Hiring Management Capacity Index

Source: the author, adapted from Brasil, 2017.

The Decision number 588/2018 – TCU – Full court ratified the creation of an index of governance in management established in 2017, according to Nogueira and Gaetane:

In 2017, from a survey conducted in 2017 with 488 organizations, integrating the questionnaires referring to four previous surveys carried out by the court in IT management, hiring, people management and results, a governance index in management was established (Decision number 588/2018-TCU-Full court). The integrated index of governance and management (iGG) was composed of the following indices: public governance; people management; IT management; and hiring management, as measured by the answers of the agencies to the survey questionnaire. This survey was repeated in 2018, within Process 015.268/2018-7. (Nogueira; Gaetane, 2018, p. 95)

Both the number of participating institutions and the number of questions increased over time. Besides the nomenclature, iGG calculation and the TCU evaluation also underwent numerous improvements and adaptations, as the analysis of their applications spread to new areas. It is not in the scope of this study to detail such evolution, however its main characteristics are indicated.

The calculation of iGG index is based on surveys made available to respondents via the internet. Based on the answers of the organizations, the TCU interpreted values within a scale of 0.00% to 100.00%. From then on, organizations were classified into three "capacity stages":

1) Initial:
1.1) Inexpressive: from 0.00 to 14.00%, 99%
1.2) Low: from 15.00 to 39.99%.
2) Intermediate: from 40.00 to 70.00%.
3) Improved: from 70.01 to 100.00%.

In 2017, the Federal University of Rondônia Foundation obtained an IGG of 35.00%, classified as an low capacity stage (initial) and, in 2018, it reached the index of 41.00%, and was classified as an intermediate capacity stage. (Brasil, 2019, p. 269)

To obtain the above-mentioned information, the data collected were interpreted according to their content. The methodology of the survey on governance assessment and organizations management, which results in iGG, presents the following structure:

a) A questionnaire is applied containing questions that must be answered and sent in digital file.
b) For example, the 2018 questionnaire consists of 173 questions distributed in five themes that group them.

c) The themes that group the questions are: a) leadership, b) strategy, c) accountability, operations, and e) results, arranged in this order also in the questionnaire.

d) Each theme has the following number of questions:

d.1 leadership – 16 questions;

d.2 strategy – 30 questions;

d.3 accountability – 18 questions;

d.4 operations – 102 questions;

d.5 results – 7 questions.

e) All questions elaborated contain a reference to the adoption of governance and management practices. Greater adherence to practices ascribes a higher score to those who adopt it, while lower adherence ascribes a lower score.

f) The scale of responses obeys the following protocol:

f.1 The answers are objective and only one answer is allowed;

f.2 The questions, in turn, are marked as being of one out of three categories: (M) for "models" in the institution; (A) for "actions" in the institution; and (E) for "existence" in the institution;

f.3 In all questions three alternatives appear as answer options:

- Not applicable;

- Does not adopt; and

- There is a formal decision or plan approved to adopt it.

f.4 All other answer options have specific text, directed to the scope of the question;

f.5 Category (M) questions, in addition to the above-mentioned common alternatives, also have as answer options:

- Adopts to a lesser extent;

- Adopts partially;

- Adopts in large part or totally.

f.6 Category (A) questions, in addition to the common alternatives, also have as answer options:

- Adopts to a lesser extent;

- Adopts partially;

- Adopts in large part or totally.

NOTE: In the options "partially Adopts" and "Adopts in large part or totally," the institution is required to prove the answers with practical evidence.

f.7 Category (E) questions, in addition to the common alternatives, also have an answer option:

- Adopts.

NOTE: In this case, the institution is required to prove the answers with practical evidence.

g) The answers receive the following valuation to account for their analysis:

Image 2 – Assignment of numerical values to the categories of the answers

ASSIGNMENT OF NUMERICAL VALUES TO THE CATEGORIES OF THE ANSWERS		
1°	does not apply	0
	Does not apply (non-treated risk)	
2°	there is formal decision or approved plan to adopt it	0.05
3°	adopts to a lesser extent	0.15
4°	adopts partially	0.5
	Does not apply (moderately treated risk)	
5°	adopts in large part or totally	1
	Adopts	
	Does not apply (controlled or nonexistent risk)	

Source: Brasil, 2018a, p. 2.

h) Data obtained, as a result of the questionnaire, are organized into four stages of governance and management capacity:

- Inexpressive;

- Initial;

- Intermediate and

- Improved.

i) The rule for grouping the response data in the four stages above is according to the following parameterization:

Inexpressive   when the obtained answers are: "Does not adopt" and "There is a formal decision or approved plan to adopt it."

Initial   when the obtained answer is: "Adopts to a lesser extent."

Intermediate   when the answer obtained is: "Adopts partially."

Improved   when the answer obtained is: "Adopts in large part or totally" and "Adopts."

j) The valuation assigned to the capacity stages receives numerical and color limits, to indicate the level in which the organization is. The reddish colors alert about critical stage, yellow alerts about a level requiring attention and green signals adequate capacity level. All levels, except the one that reached "100%," require improvement measures (< or = 99%).

Image 3 – Categorization of responses by capacity stage

STAGES		INTERVALS
INITIAL	Inexpressive	0 to 4%
	Initial	15 to 39.99%
INTEMEDIATE		40 to 70%
IMPROVED		70.01 to 100%

Source: Brasil, 2018a, p. 3.

It is noteworthy that iGG is an index used by TCU and aimed at orientation and not punishment. Thus, all the values treated in Image 3 serve for the evaluated body to base itself on its capacity for governance and management.

The final report of each year presents the results found under the name "finding." Each "finding" or a group of "findings" that have thematic affinity receives a "Conclusion" and a "Forwarding Proposal" as exemplified below:

Chart 2 – Extract "Finding-Conclusion-Forwarding" models found in the final reports of the governance evaluation in IT management – Financial Year 2007.

Finding I. Absence of strategic institutional planning in place

Finding II. Absence of current IT strategic planning

Finding III. Absence of steering committee on IT actions and investments

21. A significant percentage of the 255 agencies/entities surveyed (47%) have no strategic institutional planning in place. This fact demonstrates that almost half of the organizations researched do not have the culture of strategically planning their actions and only react to the demands and changes occurred in their sphere of action. This way of acting makes the planning of IT actions difficult.

Conclusion

30. Considering the data presented, it can be inferred that the lack of institutional strategic planning inhibits and/or hinders the planning of IT actions. From this fact may occur mistaken IT actions that would lead to waste of resources. The stimulus to the elaboration of institutional strategic planning should be the first action for the improvement of IT governance. The second step should be the stimulus to elaborate the IT strategic planning according to the institutional strategic planning.

Proposal for forwarding

33. Recommend to the Secretariat of Logistics and Information Technology (SLTI) of the Ministry of Planning, Budget and Management, the National Council of Justice and the National Council of the Public Prosecutor's Office to promote actions aimed at disseminating the importance of strategic planning and induce, through normative guidance, the bodies/entities of the Federal Public Administration to conduct actions for the implementation and/or improvement of institutional strategic planning, IT strategic planning and IT steering committee.

Source: the author

In the analysis of documents generated on complementary information of the reports it was observed the care with the legitimacy of the generated information and iGG. In 2018, for the calculation of the various aggregators (e.g., iGG; iGovTI; iGovContrat; iGovPessoas), the statistical method used was the Principal Component Analysis (PCA), and weights were calculated by multiple linear regression (Brasil, 2018a, p. 4).

In all, there are 30 modalities of governance practices included in the questionnaire, measured by 100 verification items. The correlation of the above mentioned aggregating indices is shown in the following table:
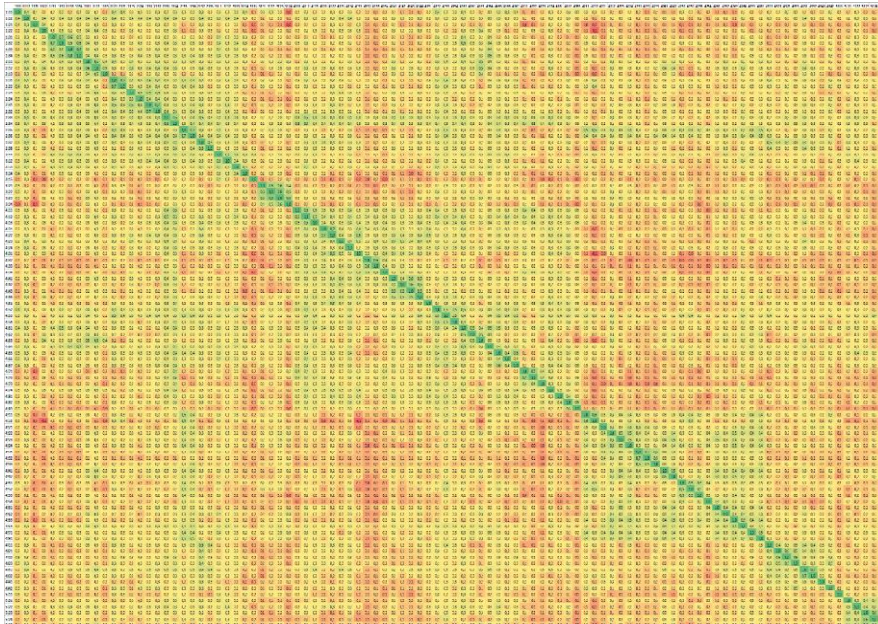

Image 4 – Matrix of correlations between iGG verification items

Source: Brasil, 2018a, p. 11.

The colors on image 4 are interpreted from the following assignments:
- green indices - high correlation;
- yellow indices - medium correlation;
- red indices - low correlation.

The sample is evaluated by the following statistical indices: a) Cronbach's Alpha Coefficient, b) Bartlett's Sample Sphericity Test, c) Sample Adequacy Measure (Kaiser-Meyer-Olkin "KMOMSA") and d) by the amount of responses.

In 2018 the Principal Component Analysis (PCA) was used to conduct the multivariate response analysis. In view of its wide use, the minimum waste method was the one adopted for the component extraction. The method has the advantage of using almost the entire variance of the sample. (Brasil, 2018a; Revelle, 2015; Tabachnick; Fidell, 2007). And the evaluation of 2014, Appendix 1 brings:

The matrix of correlations presented in Table 3 indicates that, in each practice, the respective control items are highly convergent among themselves (correlations colored green), with emphasis on the high correlations in C11, C21 and C22, including the pairs C21xC22 and E22xE23, marked together in the table. (Brasil, 2014, p. 20)

Image 5 – Correlation matrix among control items in simplified iGG, grouped by practice

Source: (Brasil, 2014, p. 20)

Regarding the quality of the data analysis, the great majority of the correlations among control items of distinct practices presented value equal or superior to 0.30. The matrix of 7,770 available answers presents an alpha value of Cronbach of 0.98, with 95% certainty. In addition, the Kaiser-Meyer-Olkin sample suitability measure results in a value of 0.97 and the Bartlett test for sphericity or homogeneity of the sample resulted in chi-square=3936.6, with 60 degrees of freedom and p probability less than 2.2×10^{-16}. All these values are considered very good, indicating that the questionnaire was well constructed and the data were convergent and consistent (Bezerra; Corrar, 2006, P. 52-54; Maroco; Garcia-Marques, 2006, P. 69). (Brasil, 2014, p.20)

Proceeding with the extraction of six factors by the minimal waste method and with PROMAX rotation, it resulted in 63% of the variance of the sample explained (Figure 13). There were many reasonably strong correlations between the extracted factors (MR1 to MR6), confirming the interdependence between them, as would be expected, since all practices theoretically measured had mutual influences and intended to contribute to the improvement of a single theoretical construct: the public governance. (Brasil, 2014, p. 21)

For this reason, and in order to simplify the analysis keeping it oriented to practices, a single factor ("public governance") was extracted, by the method of minimum residues (in this case, there was no need of rotation), as the factor MR1, that explains 42% of the variance of the sample was obtained (Figure 14). (Brasil, 2014, p. 21)

Still on factor analysis, the complementary information of individual report brings about other years in which it was used:

This method was applied in the survey of governance of people of 2012-2013 (Decision 3.023/2013), and in the survey of the federal acquisitions governance in 2013-2014 (TC 022.577/2012-2). (Brasil, 2014, p. 31)

It was observed that many are the technical criteria that outline the structure of the current iGG. As its creation based on the need to evaluate the quality of governance and management, it is appropriate to investigate how significantly it has contributed to improving such quality. Following this point is discussed.

4 Discussion

The analysis of the data gathered from a chronological structuring allowed to obtain important information on the genesis and effectiveness of iGG, especially regarding its importance and application for the improvement of the quality of public management in Brazil.

The TCU, as a supervisory agency, has the function of externally controlling public institutions, as direct and indirect entities of the federal power. (Sundfeld; Câmara; Monteiro; Rosilho, 2017). The TCU is also aimed at controlling their normative, sanctioning, inspecting, corrective, judiciary, advisory and informative functions. Under these competencies the TCU visualized in 2007 a basic tool to help improve governance in Brazilian public agencies: the IT area:

One of the great challenges of the current Federal Public Administration is to increase its degree of governance. The TCU, as an external control agency, plays a major role in improving this area. In this context, information technology (IT) governance is essential to achieve this goal. IT is the true engine of modern organizations and can either drive them far forward or hinder their progress. (Brasil, 2008, p. 5)

The data collected in this survey started with the IT area and at first the results indicated weak structure in all government bodies analyzed. The IT area is considered strategic to achieve good results in organizations (Laurindo, 2001; Przeybilovicz, Cunha, Meirelles, 2018). As the governance and management evaluation advanced from its first application, from 2007 to 2019, the indices improved, indicating that the government organizations enhanced their governance capacities (Brasil, 2018b).

The consideration of the above citation refers to the evolution that the governance evaluation carried out by the TCU has undergone. The initial nature of TCU's work via SEFTI, which was the unification of information on IT governance in public organizations, also allowed unifying data on governance in areas such as personnel and hiring, for example. The initial step, through IT, made it possible to improve the technology sectors of these institutions. In this sense, it is possible to say that IT is a basic area for governance quality improvement, allowing to innovate in all other areas of public organizations.

Thus, it is possible to innovate in the public area, perhaps giving up the guidelines of classic areas such as economics, administration, among others, without ever letting them out of the process, of course, to embark on a new area, of greater affinity with the contemporary digital society. Technological innovations represent a discussion in this direction. Several authors point out technological innovations as an alternative way to improve the quality of public management. (Heckert; Aguiar, 2016) (Brandão; Bruno-Faria, 2013).

Public institutions are under pressure on the need to adapt to new technologies (Alho; Carvalho, 2007). Thus, equipping the public sector with such innovations can mean achieving great progress towards excellence in public administration. According to Teciano:

In the public sector, innovations are also increasingly necessary, especially in the context of the state crisis and administrative reforms, which require new forms of service delivery from public managers in order to make governments stronger and capable of dealing with a globalized economy and more participative and demanding society. In addition, the public sector also needs partnerships that bring innovations in management and new organizational tools (Teciano, 2014, p. 31).

Given the above, this study and results achieved by TCU's pioneering initiative to gather information on IT governance in Brazil is considered extremely relevant. In a recent article, Sundfeld et al. (2017) address the value of TCU's decisions and recognize the importance of its actions:

Evidently, the only internal or preliminary value of any manifestation of the TCU does not take away its importance, [...] … in TCU's inspection processes, a large part of the decisions (and also of the reasons adopted as grounds by the ministers) are issued on a preliminary basis, for procedural purposes only, i.e., to approve studies, determine steps or analyses, or allow the manifestation or defense of interested parties. (Sundfeld et al., 2017, p. 886)

The preliminary report on IT governance was fundamental in reconfiguring the attention and importance of this area by public institutions in Brazil. The steps and analyses carried out by the TCU, in the form of recommendations, had greater effect than perhaps would have occurred if the role of the TCU had been imbued with definitive, condemnatory, or legally binding decisions, a topic discussed by Sundfeld et al. (2017).

The TCU properly clarifies that the adoption of iGG by public agencies is not mandatory, while at the same time advises them to be aware of the responsibilities of the best decisions of managers to improve the quality of governance:

In this sense, it is very important to understand that it is not mandatory aiming the maximum value for iGG. However, like the guidelines of ABNT NBR ISO/IEC 31000, it is the responsibility of the highest authority to decide – through critical analysis of the relevant risks and the needs of the organization – which is the most appropriate goal to be achieved in each practice of the self-assessment instrument. The set of goals should be formalized as part of a plan, attending to the legal goals of mandatory compliance. (Brasil, 2014, p. 15)

Essential for the improvement of the results of the evaluation of governance and management was the fact that the organs evaluated were the producers of the data themselves, without the inspecting presence of the TCU. The information sent by the agencies and returned by the TCU in the form of spreadsheets and graphs of results, allowed each body to visualize itself in the system of Brazilian public institutions. The self-assessment was determinant for each body to take the liberty of wanting to improve in relation to its own index, pointed out by the application of iGG.

When this study began, the expectation was to find a homogeneous chain of application of the index by the TCU in Brazilian public agencies, with standardized methodologies and results, as well as a regular chronology of applications. However, different applications of the evaluation method were found, which varied according to the application area (2007, 2008, 2010, 2012, 2014, 2016 information technology governance), (2012, 2013 staff governance), (2013, 2014 acquisition governance), (2017, 2018 integrated areas), between applied indices (iGovTI, iGestTI, iGov, iGG) and periodicity variation (in 2019, for example, no evaluation occurred). In 2018 the indices received new denominations and new accommodations of statistical methodologies and methods. The iGovTI, for example, appears in the final iGG report table of 2018 as iGestTI, a split of the former.

In fact, iGG was created in 2017 as a way to unify different indices applied in different years and areas, since its first application in 2007. For each iGG application, different statistical models were adopted, depending on the best mathematical accommodation that the commission deemed to be the most appropriate for the area and context. However, the alternation of areas, periods and indices did not jeopardize the initial goal of the study as shown in the following table on the scope of the evaluation in the years 2017 and 2018:

Chart 3 – Comparison between the percentage of agencies and entities that were in the initial stage of capacity of each index in 2017 and 2018

Index	2017	2018
IGG (General Governance and Management Index)	58%	47%
IGovPub (Public Management Capacity Index)	41%	39%
IGestPessoas (People Management Capacity Index)	69%	64%
IGestTI (IT Management Capacity Index)	50%	41%
IGestCont (Hiring Management Capacity Index)	56%	41%

Source: Decision number 2699/2018 – TCU – Full court (Brasil, 2018c)

Chart 3 shows that in all the applied indices there was a reduction in the number of organs that were in the initial stage, indicating that they moved to a higher stage, which means improvement in the governance and management indices.

The application of the evaluation through iGG is relevant to the quality of governance and management of public agencies in Brazil as this quality is being improved at each new evaluation made by the TCU. The results shown in Chart 3 reveal how much the level of the initial stage the institutions were in has fallen.

It is worth remembering that the application of iGG is an informed self-assessment by the agencies themselves. Perhaps the reality of some agencies may be different from that revealed by the evaluation. The final reports of iGG make this very clear:

It should be noted that iGG is based on information declared by the managers themselves, and there has been no verification of the real reliability of the responses. Therefore, the answers of some organizations may not adequately represent reality, due to

errors in the self-assessment process, problems in question interpretation, among other factors that may make the answers inaccurate. (Brasil, 2014, p. 15)

The validity of the data reported in self-assessment questionnaires is an important concern. Such validity can only be directly assessed through field audits specially designed for this purpose, which would be very costly and consequently of doubtful efficiency. (Brasil, 2018a, p. 12)

However, this condition in no way decreases the merit and relevance that the work initiated by TCU in 2007 had in improving the quality of governance and management of Brazilian public agencies. Before the information gathered by TCU, there was nothing similar about the situation of the national framework. Through the data informed by the TCU, the institutions were able to seek to improve their indices and to do so began to develop actions and implement structural changes, management, among others found in the questionnaires answered by the institutions and available at the TCU's website as open data[ii].

An institution that grew along with the other evaluated organizations during the development of iGG was the TCU itself. A comparison found by the survey revealed the maturity of that court when producing the documents that induced the evaluation processes. The use of complement in the concept of governance may reveal a greater maturity of governance and management of the TCU in relation to the evaluation of the institutions. To illustrate this point, an excerpt of the guidance content presented by TCU in 2014 was replicated and then complemented in 2018:

All the assertives of the questionnaire present good practices that can be adopted to develop governance in the organization. Thus, the greater adherence to these practices would indicate the possibility of also having more governance in the organization. (Brasil, 2014, p. 4)

All the assertives in the questionnaire present good practices that can be adopted to develop governance and management in the organization. Thus, the greater adhesion to these practices indicates the possibility of also having **greater maturity** in governance and **management** in the organization. (Brasil, 2018a, p. 1. Emphasis added.)

Some basic descriptions found scattered and repeated in different documents and final reports produced over 10 years of application of the governance and management evaluation of Brazilian public agencies by the TCU were added.

For now, it can be affirmed that iGG is formed by four other sub-indices: public governance index, people governance index, IT governance index and hiring governance index. In turn, the governance and management indices were unfolded into management capacity indices: people management capacity index (iGestPersons), IT management capacity index (iGestTI) and hiring capacity index (iGestContrat).

By concluding the review of iGG implementation process there is a possibility to relate its importance to the improvement of the quality of public management referring it as a technological innovation process. iGG was responsible for triggering improvements in the management capacity indices of the evaluated agencies according to the citations regarding the reports presented in this study. Furthermore, iGG can be considered a technological innovation with regard to its construction and

maturation process. The Organization for Economic Cooperation and Development – OECD (2005) concept was adopted on technological innovation to support the result presented:

An innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organisation or external relations. (OECD, 2005, p. 46).

The implementation of 'new' service according to the OECD may characterize iGG in Brazil. In assessing the quality of governance and management of public agencies in the country, the evaluation process was significantly improved by the TCU itself, throughout all the applications carried out, resulting in 2017, in iGG. In addition, the premise announced by Oliveira and Pisa (2015) that it was urgent to evaluate the quality of governance and management of Brazilian public agencies in order to improve it could be slowed down by TCU.

The improvement of governance and public management indices are included in the reports[iii] authored by the TCU in Brazil. It is difficult to understand that the data disposed there compose iGG, as the site registers the original name at the time of its application, without further explanation on why it differs from the current name adopted.

5 Conclusion

This study achieved the objective of describing iGG and presenting its association with the improvement of public management quality in Brazil. The contributions to achieve the objectives of the theoretical analysis came from the works of Laurindo (2001); OECD (2005); Brasil (2008; 2014; 2018a; 2018b; 2018c); Brandão and Bruno-Faria (2013); Teciano (2014); Oliveira and Pisa (2015); Heckert and Aguiar (2016); Przeybilovicz et al. (2018); all quoted herein, especially due to the urgency and improvement discussed by Oliveira and Pisa (2015).

However, despite the extremely relevant role played by iGG for the quality of governance and public management in Brazil, the digital platform of TCU, related to iGG data from 2018[iv], could better reflect the implementation, evolution and current status of iGG. A suggestion is to improve this presentation of iGG's trajectory by informing researchers, students, stakeholders and citizens in a more accessible way about it and how iGG evolved along its application from its first version in 2006, to the present day.

As contribution, this study suggests attributing to iGG the nature of technological innovation index through the work of the TCU in the Federative Republic of Brazil, aiming at the evolution and improvements that the evaluation method itself has undergone, as well as the improvement in the quality of Brazilian public management, which was recorded in evaluation reports over the years. The respective evaluation process has been significantly improved since its first application, with the aim of gathering information on the Brazilian framework of governance and management of information technologies, until the incorporation of various indices into a single one that was called iGG.

It is worth pointing out the limitations of this survey: it is a comprehensive description of iGG rather than a in-depth and detailed specification of the nature and process of the index. Future works may

continue this description and analysis, as well as carry it out individually for each index that composes iGG: a) iGovPub; b) iGestPersons; c) iGestTI and d) iGestCont), thus establishing the contribution of each, in a separate manner, to improve the quality of governance and public management capacity in Brazil.

Another aspect that is worth exploring is the approach to iGG as a process of technological innovation. The most recent version of the OECD's 2018 Oslo Manual focus on innovation reaching four dimensions: knowledge, novelty, implementation and value creation. When considering iGG as a process of technological innovation, what would be its approach to these dimensions? And if it were considered a technological innovation index and not a process, how would it be described? These and other approaches may complement the limited scope of this research.

Finally, this study is still initial, requiring more conclusive and comprehensive analysis. Nevertheless, it contributed to maturing this construct, improving the work of governance and public management evaluation in Brazil. In fact, there were advances in the percentages presented in iGG application reports.

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