Article

Governance maturity and public value creation in public higher education institutions: the case of Brazilian universities

Maturidade de governança e criação de valor público em instituições públicas de ensino superior: o caso das universidades brasileiras

Madurez de la gobernanza y creación de valor público en instituciones públicas de educación superior: el caso de las universidades brasileñas

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Abstract: This study aims to analyze the relationship between the level of governance and value creation in federal universities (FUs) in Brazil for the year 2018. The study includes 56 FUs and is characterized as descriptive, documentary and quantitative. The achievement of the established objective occurred in three moments. In the first one, the public value of each FUs was measured. The proxy used to measure public value was efficiency, obtained through the Data Envelopment Analysis methodology. In the second moment, the stages of governance by each institution were presented and finally, in the third moment, the relationship between the governance level and the generation of public value was discussed, using Pearson's correlation. A positive relationship was found between efficiency and the level of governance. The positive relationship found showed the importance of strengthening public governance mechanisms in higher education institutions, reinforcing their commitment to the production of knowledge and the quality of their actions, legitimizing their role in society. This study innovates among the publications in the literature as it is the first investigation that aims to analyze and confirm the relationship between the two constructs: level of governance and public value, essential for the management of public institutions, especially in an environment of fiscal austerity. It's expected that the study will support the managers of the FUs to understand the relationship between efficiency in the application of public resources and levels of governance, with a view to maximizing the value of the institution.

Keywords: public value; governance maturity; federal universities.

Resumo: Este estudo analisa a relação entre o nível de governança e a geração de valor nas universidades federais (UFs) do Brasil para o ano de 2018. O estudo contempla 56 UFs e é caracterizado como descritiva, documental e quantitativa. O alcance do objetivo estabelecido deu-se em três momentos. No primeiro, efetuou-se a mensuração do valor público de cada UFs. A proxy utilizada para mensurar o valor público foi a eficiência, obtida por meio da metodologia Data Envelopment Analysis. No segundo momento apresentou-se os estágios de governança por cada instituição e por fim, no terceiro momento discutiu-se a relação entre a nível de governança e a geração de valor público, pela correlação de Pearson. Foi encontrada uma relação positiva entre a eficiência e o nível de governança. A relação positiva encontrada mostrou a importância de fortalecer os mecanismos de governança pública nas instituições de ensino superior, reforçando seu compromisso com a produção de conhecimento e com a qualidade de suas ações, legitimando seu papel na sociedade. O presente estudo inova entre as publicações da literatura por ser a primeira investigação que visa analisar e confirmar a relação entre os dois construtos: nível de governança e valor público, essenciais para a gestão das instituições públicas, principalmente em um ambiente de austeridade fiscal. Espera-se que o estudo apoie os gestores das UFs a entenderem a relação da eficiência na aplicação de recursos públicos e os níveis de governança, com vista a maximização do valor da instituição.

Palavras-chave: valor público; maturidade de governança; universidades federais.

Resumen: Este estudio analiza la relación entre el nivel de gobernanza y la creación de valor en las universidades federales (UF) de Brasil para el año 2018. El estudio incluye 56 UF y se caracteriza por ser descriptivo, documental y cuantitativo. La consecución del objetivo planteado se produjo en tres momentos. En el primero se midió el valor público de cada UF. El proxy utilizado para medir el valor público fue la eficiencia, obtenida a través de la metodología de Análisis Envolvente de Datos. En el segundo momento, se presentaron las etapas de gobernabilidad de cada institución y, finalmente, en el tercer momento, se discutió la relación entre el nivel de gobernabilidad y la generación de valor público, utilizando la correlación de Pearson. Se encontró una relación positiva entre la eficiencia y el nivel de gobernabilidad. La relación positiva encontrada mostró la importancia de fortalecer los mecanismos de gobernanza pública en las instituciones de educación superior, reforzando su compromiso con la producción de conocimiento y la calidad de sus acciones, legitimando su rol en la sociedad. Este estudio innova entre las publicaciones de la literatura, ya que es la primera investigación que tiene como objetivo analizar y confirmar la relación entre los dos constructos: nivel de gobernabilidad y valor público, esenciales para la gestión de las instituciones públicas, especialmente en un entorno de austeridad fiscal. Se espera que el estudio ayude a los gestores de la UF a comprender la relación entre la eficiencia en la aplicación de los recursos públicos y los niveles de gobernabilidad, con miras a maximizar el valor de la institución.

Palavras clave: valor público; madurez de la gobernanza; universidades federales.

1 Introduction

More than 2 million higher education vacancies in Brazil, approximately 25% of all vacancies in higher education, are offered by public institutions. Approximately 64% of them belong to higher education institutions linked to the Federal Government. The budget of federal universities in 2020 corresponded to approximately R$103 billion and it has been reduced in the last few years due to the fiscal crisis in the Brazilian public sector. Despite the need of fiscal adjustments in State coffers, providing access to education, sciences and technology is among the duties of the Brazilian Sate, based on the 1988 Federal Constitution.

Based on such a fiscal austerity, Brazilian public universities have been under pressure to legitimize their role in the expansion and consolidation of higher education in the country. The legitimacy of public institutions can be assessed through the ability of generating public value (MIMBI; BANKOLE, 2016). According to Moore (1995), public value is generated when the outcomes of public policies are following public interests.

Ott (2010) argues that public value is essential for public management at the time to ensure citizens' satisfaction and trust. The higher pressure over citizens' demands for public value has been contributing to the adoption of an entrepreneur governance approach (BLAUG; HORNER; LEKHI, 2006).

Thus, the concept of public value gains room in current debates about governance in the public sector. Public value creation becomes key element for responses to modern public management challenges either in the New Public Service perspective by Robert Denhardt (2002) e Janet Denhardt e Robert Denhardt; 2015) or in public value management perspective by Gerry Stoker (2006).

The present article approaches public value creation based on the perspective followed by the second axis of the strategic public management triangle suggested by Moore (1995), who addresses the accomplishment of desirable outcomes. Accordingly, public governance and public value generation are the objects of analysis in this investigation. Therefore, assumingly, public governance maturity is linked to public value creation by higher education institutions.

There is a lack of scientific research in Brazil about university governance, therefore, there are gaps to be filled (GESSER *et al.*, 2021). Studies are recommended to analyze university governance from the perspective of different academic and administrative activities, and to investigate the relationship between university governance and other topics relevant to University Management (GESSER *et al.*, 2021).

Therefore, the scarcity of research approaching the relationship between governance maturity and public value is the gap of this research. This approach is mainly relevant within the current fiscal austerity context experienced by several countries. Many public institutions around the world have been pressured to enhance

their governance mechanisms in order to potentiate the reach of the desired outcomes and, consequently, legitimate their relevance within the social context through public value generation.

The search for efficiency in the higher education environment is important for public higher education institutions (HEI), mainly in the austerity context, which demands a more productive management of public resources and the States' duty to present its accounting to society (MARTÍNEZ-CAMPILLO; FERNANDEZ-SANTOS, 2020).

Recent studies have assessed universities' efficiency in applying public resources in several countries (AGASISTI; RICCA, 2016; MAMMADOV; AYPAY, 2020; MARTÍNEZ-CAMPILLO; FERNANDEZ-SANTOS, 2020; RAMIREZ-GUTIÉRREZ; BARRACHINA-PALANCA; RIPOLL-FELIU, 2020; VISBAL-CADAVID; MARTÍNEZ-GÓMEZ; GUIJARRO, 2017). These studies aimed at investigating the degree of efficiency in the assessed universities regarding their resources available and generated outcomes, as well as factors facilitating and hardening efficiency reach, and factors associated with it. However, there was no evidence in the literature about association between education institutions' efficiency as public value element and public governance maturity level.

Therefore, the aims of the current study are to fulfil the gap left by previous research and, most of all, to investigate the association level between governance maturity and public value generated by Brazilian public universities. The present article takes public universities' efficiency as variable to measure Public Value generated to society. Efficiency is assessed through higher education quality based on financial, material and human inputs available for the assessed universities.

The present study innovates among publications in the literature since it is the first investigation aiming at analyzing and confirming the relationship between the two constructs: governance level and public value, which are essential for public institutions' management, mainly within a fiscal austerity environment. These institutions are called to reinforce the importance of their role in the economic and social development of the environment they are inserted in.

2 Public Value

The Public Value School was initially developed by Mark Moore (1995) at Harvard Kennedy School of Government. The core idea of public value is analog to the value generation doctrine for shareholders in the private sector. It emphasizes the broadening of governments' role in value production to society and public service users' and in reinforcing the reliability and legitimacy of public decision-making. Its main emphasis lies on the key role of public managers in orchestrating public value creation (KELLY, 2007).

Moore (1995) argues that Public Value is determined by citizens' preferences; therefore, it must guide the provision of public services, which is perceived by differences between benefits created by public policies and resources provided by citizens. At national analysis level, the evaluation of public preferences can be designed by a set of different performance indicators, for instance: income differences, access to essential values, education deeds, crime and violence level.

Moore (1995) sets governmental programs and services must aim at (1) something that is substantially valuable, that has public value; (2) legitimate and politically sustainable actions; and (3) operationally and administratively feasible actions. The strategic triangle by Moore (1995) suggests that public managers must approach three main axes to create public value: Services – provision of high-quality services; Outcomes – reaching the desirable outcomes and; Trust – supporting high trust levels between citizens and government.

Bryson, Crosby and Bloomberg (2014) argue that the concept of public value initially proposed in the literature by Moore (1995) mainly derived from governments' performance. Thus, Moore (1995) believes that citizens wish a mix of expectations from their governments that, all together, encompass the public value: (1) public organizations guided to high-performance services, (2) efficient and effective public organizations to reach the expected social outcomes, and (3) public organizations operating in a legitimate and fair way. Moore (1995) highlights specific public values: efficiency, effectiveness, socially certified expected outcomes, procedural justice. Thus, Moore's definition of public value can cover input, process, output and measured outcomes.

Recently, Moore (2014) developed the philosophical fundamentals of his public value approach as a framework to set what he calls "public value accounting". Besides the benefits, one finds the collectively assessed outcomes, whereas besides costs, one finds the costs of using public authority and assets of public property.

Thus, public value can work as criterion to assess public organization development in service supplying based on the comparison of generated outcomes to the socially desired ones (MIMBI; BANKOLE, 2016).

We herein understand public value as the outcomes the public power – legally instituted and acting as citizen agent – declares as target to be reached by using the organizations' resources (MOORE, 1995). According to Collis and Montgomery (1995), resources made available to the organizations, be them public or private, represent the means available for the institution to efficiently and effectively reach the expected outcomes.

The idea of creating public value has been used as paradigm, rhetoric, narrative and public performance analysis (ALFORD; O'FLYNN, 2009). Recent advancements in the public value theoretical group bond value generation to collaborative network

governance (BRYSON, 2012; BRYSON *et al.*, 2017). Stoker (2006) suggested public value management as a new public management paradigm adjusted to network governance; therefore, it would align New Public Service ideas to New Public Governance. Stoker (2006) goes beyond the main focus by Moore and turns the discussion on public value generation bond into inter-organizational and inter-sectoral network governance relationships.

Similarly, Janet Denhardt and Robert Denhardt (2015) introduced a new approach for public management by highlighting four important attributes that, all together, represent a new response to current challenges and old shortcomings. These attributes include emphasis on public value; recognizing that the government plays special role in ensuring public values; believe on the importance of broadly conceived public management forms and public services' supplying to the population; as well as emphasis on citizenship, and on a democratic and collaborative governance.

3 Public Governance in Brazil

The public sector performs important role in society. In most countries, public expenses account for a significant fraction of GDP. Public sector entities are substantial employers and the main players in the capital market. The aim of public sector entities is to reach the expected outcomes, which include improving or maintaining citizens' well-being.

Public management counts on different stakeholder types given the several functions performed by the public sector. Governance in this sector becomes an important tool to align the expectations of the public sector to those of the private sector, non-governmental organizations and civil society (IFAC, 2014).

Governance encompasses the arrangements set by the organization to ensure that the institution's expected outcomes are in compliance with stakeholders' goals and that they are, actually, accomplished (BRENES; MADRIGAL; REQUENA, 2011). According to Slomski *et al.* (2008), more than developing the way through which an organization is managed, governance in the public sector also encompasses the corporative structure, culture, politics and the mechanisms adopted for the relationship between the institution and several stakeholders (MARQUES, 2007; SLOMSKI *et al.*, 2008).

Good governance in the public sector encourages more-informed and longer-term decision-making to reinforce the accountability for public resources' management (their efficient use). Good public governance practices make public managers acknowledge the need of concentrating long-term programs and policies, and of having in mind that their actions reflect on outcomes that will be perceived by individuals beyond their own voters. They must, therefore, take into account the impact of current decisions and actions on future generations (IFAC, 2014).

Public sector governance in Brazil has become stronger in the last few years. Some efforts by core federal public institution-control bureaus have stoodout for following the advancements in the implementation of governance mechanisms by federal institutions.

Back in 2013, the Federal Court of Accounts (TCU) issued the Basic Governance Reference applied to public management organs and entities. The Court reinforced the governance principles for the public sector in this document, which was based on requirements by the World Bank. These principles must be followed by Brazilian public entities, namely: legitimacy, equity, accountability, efficiency, probity, transparency and accountability. Besides, the document sets 24 good-governance guidelines. It is also an effort to guide public entities on how to implement public governance mechanisms (BRASIL, 2014).

In 2014 TCU's Governance Reference was up-dated and, nowadays, it is in its third version (BRASIL, 2020). This document sets that leadership, strategy and control mechanisms must be adopted for governance functions (assessing, guiding and monitoring) to be performed in a satisfactory way.

Leadership concerns the set of human or behavioral practices that ensure the existence of the minimal conditions for the exercise of good governance. Among them, one finds accountable, motivated and qualified righteous people in the main positions in organizations to lead the work processes (BRASIL, 2014). The strategy necessary for a good governance involves aspects such as attentive hearing the stakeholders' general demands, needs and expectations; assessing the internal and external environment in the organizations; evaluation and prospection scenarios; strategy definition and achievement, among others. Control is essential to reduce process risks, which involve clear information about its actions and accountability over the taken actions (BRASIL, 2014).

Since 2014, TCU has been elaborating the Organizational Integrated Governance Screening, which concerns TCU's screening in Federal Government Bureaus. It has been elaborated based on TCU's Governance Reference in order to gather information about the ability of federal public organizations to guide and rule the resources they are in charge of and to contribute to governance and public management enhancement (BRASIL, 2014).

Based on such a screening, TCU assesses institutions' public governance maturity through an indicator that ranges from 0 to 1, which is divided into 3 maturity stages: initial, which is subdivided into non-expressive (0% to 14.99%) and initial (15% to 39.99%), intermediate (40% to 70%) and enhanced (70.01% to 100%).

Since its first edition, TCU has been following-up the governance maturity of Brazilian public institutions. The first edition of the screening was carried out in 2014, the second one, in 2017; and the third edition was issued in 2018.

The evaluation methodology consists of conducting a survey with federal Public Management bureaus and entities. The Integrated Governance and Public Management Questionnaire encompasses 30 practices that are assessed through 100 assessment items related to components associated with governance mechanisms (BRASIL, 2018). Such a set of questions leads to the composition of the general governance indicator, the so-called "Integrated governance and public management index (iGG)". This indicator, in its turn, comprises the sub-indicators:

a) Public governance index (iGovPub): which assesses ability regarding Leadership, Strategy and Accountability;

b) Governance and people management index (iGestPessoas): which assesses the ability on the governance and people management axes;

c) Governance and IT management index (iGovTI): which assesses ability on the governance and IT management axes;

d) Governance and hiring management index (iGovContrat): which assesses ability on the governance hiring management axes.

The theoretical model developed by TCU to assess governance maturity is depicted in Figure 1.
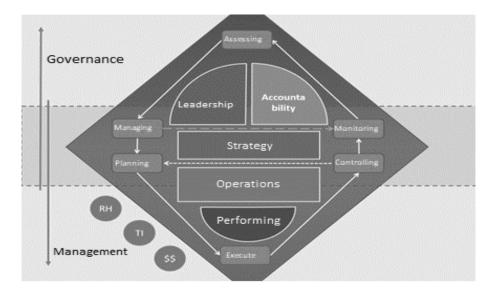
Figure 1 – Theoretical model to evaluate governance maturity

Source: Adapted from TCU (BRASIL , 2018)

Figure 1 represents the basic elements of a governance and management system. The upper part of it depicts governance activities and structures, and the lower part of it shows the management ones. Governance comprises three mechanisms: Leadership, Strategy and Accountability, whereas the topic "Management"

encompasses Operations and Outcomes. The triad assessing-guiding-monitoring represents the essential governance activities. High managerial spheres assess their own organization, where it is at and what direction to take. Subsequently, it issues the Management guidelines. Right after that, guidelines' following is monitored by the high management spheres and new governance evaluation is subsidized (BRASIL, 2018).

Management, in its turn, gets the high management guidelines and must plan, perform the activities and control the taken actions. Information generated by control will subsidize either the new Management planning or the Governance monitoring. Finally, but yet within the Governance dimension, one finds Accountability, which reflects on the set of processes adopted to select, organize and make information available to stakeholders (BRASIL, 2018).

4 Efficiency of Federal Universities

Public efficiency is a topic often seen in the agenda of public institutions since the 1980s, given the ascension of competition, information technologies, more democratic demands, among others (GÜNAY; DULUPÇU, 2019). The sense of "efficient State" is guided by the efficient use of public resources focused on resource's management based on product rather than on input. It has been emerging as a relevant research topic in the public sector scope (DEMIREL, 2006).

Baracho (2000) adds that the efficiency analysis seeks comparing the service provided by an institution based on its costs. According to the Department of Economic and Social Affairs DESA (UNITED NATIONS, 2007), its broadest definition comprises the allocation of public expenses and the ability of public institutions to manage the economy and implement public polices in a stable and predictable way.

Public institutions in several countries have faced continuous reduction in the financing of their activities in the last decades. Such a process has pressed education institutions to prove and keep teaching-service supply for a growing demand by students but, without, having the corresponding increase in governmental funding for the development of their activities (AGASISTI; RICCA, 2016).

Several governments and higher education organizations have been implementing strategies aimed at enhancing universities' efficiency and ensuring that they are properly managed. The allocation of public resources and their efficient use are closely related to factors that encourage researchers in the education economy field to focus on the evaluation of teaching institutions' efficiency (VISBAL-CADAVID; MARTÍNEZ-GÓMEZ; GUIJARRO, 2017).

Martínez-Campillo and Fernández-Santos (2020) highlight that knowing the efficiency level of higher education institutions is quite useful to get to know to which extension HEIs have used public funding in their teaching and research activities and

adopted measures to improve their management. Agasisti and Ricca (2016) argue that giving more autonomy to Italian universities in the last few years has led to stronger pressure for increasing their efficiency by "producing" the teaching activity for a larger volume of students and by improving the quality of the developed research.

Studies carried out all around the world have assessed the efficiency of teaching institutions that play relevant role in knowledge generation and in nations' economic growth, given nowadays fiscal austerity, which imposes continuous reduction in financial resources and increased demand (MAMMADOV; AYPAY, 2020).

5 Methodological Procedures

This study investigates the association level between governance maturity and public value generated by Brazilian public universities. Takes the public universities' efficiency as variable to measure Public Value generated to society. Efficiency is assessed through higher education quality based on financial, material and human inputs available for the assessed universities.

6 Population, Sample and Data Collection

Population in the current study comprised 69 Brazilian Federal Public Universities (FUs). They were selected to the analysis of universities that have published their FUs' Management Reports and that have their governance assessed and disclosed by TCU in the Individual Self-evaluation Report. The assessed reports correspond to 2018; they were collected from universities' websites and from TCU's website, respectively. Federal Universities founded after 2018 and the ones presenting incomplete information necessary for the analysis were excluded from the sample. Therefore, the final sample counted on 56 Fus.

7 Efficiency measuring

Efficiency in using financial, material and human resources by FUs was found by adopting the input-oriented DEA-CCR methodology. DEA is a statistical technique applied to identify production borders through linear programing. Outcomes in this technique range from 0 to 10, only DMU presenting efficiency score equal to 0 are inefficient (COELLI; RAO; BATTESE, 1998). The other DMUs are classified on efficiency bands divided into low efficiency degree (from 0.1 to 0.25), intermediate efficiency degree (from 0.26 to 0.50), good efficiency degree (from 0.51 to 0.75), high efficiency degree (from 0.76 to 0.99) and maximum efficiency degree (when score = 1) (SCHERER et al., 2016).

DEA-CCR emphasizes the constant scale returns, there is a proportional variation in the outputs at each percentage variation in inputs. This model seeks to maximize

some increase in outcomes by keeping resources unchanged. Outcomes were found in SIAD software (Sistema Integrado de Apoio a Decisão) – version 3. Variables composing the inputs and outputs are shown in Frame 1.

Frame 1 - Efficiency Measurement Variables

Variable	Description	Formula	Source
INPUTS			
Immobilized	Immobilized/ Equivalent student	$\dfrac{Imobilized\ total}{Equivalent\ student}$	FUs' Management Report
Current cost	Current cost/Equivalent Student	$\dfrac{Current\ cost}{Equivalent\ Student}$	FUs' Management Report
Professors	Full time student / Equivalent professor	$\dfrac{Full\ time\ student}{Equivalent\ Professor}$	FUs' Management Report
OUTPUTS			
CAPES/MEC Score	CAPES/MEC score recorded for post-graduation	$\dfrac{\sum SCores\ of\ all\ Post\ gradiuation\ programs}{N.\ of\ post-graduation\ programs}$	FUs' Management Report
Success rate	Success rate at graduation level	$\dfrac{n.\ of\ graduates}{Total\ n.\ of\ students\ entering\ the\ university}$	FUs' Management Report

Note: Equivalent student = number of full time undergraduate students + number of full time post-graduation students + number of full time internship students.

Source: Own elaboration.

The choice for the variables composing the inputs was based on the proposition of having the research focused on all resources available for FUs employees, be them material, financial and human. Variable "immobilized" was herein used as material resource, it refers to the total number of immobilized assets applied to each student enrolled in the institution. Current Cost represented the financial volume applied to teaching activities, research and extension programs available for each student. Variable "professor" represented a fraction of human resources, it was herein used to determine the number of professors available – full time - for each student.

Both research outputs (CAPES/MEC scores and Success rate) were based on the study by Costa *et al.* (2012) and Nuintin *et al.* (2014). The CAPES/MEC score refers to the association between the sum of scores of all Masters and PhD courses and the total number of assessed graduated courses (COSTA *et al.*, 2012). The Success rate reflects the ratio between the amount of students and the total number of students entering this level (COSTA *et al.*, 2012; NUINTIN *et al.*, 2014).

8 Association between Efficiency and Governance Maturity Level

After identifying the degree of efficiency in implementing public resources in FUs, this study has analyzed its association with governance maturity level through the Person's correlation matrix. Governance maturity level was measured through the integrated governance and public management index (IGG), which was outspread in the individual self-evaluation Report made available at TCU's website – its value ranges from 0% to 100%.

Pearson's correlation identifies the degree of linear association between two quantitative variables, which can range from -1 to 1. The positive or negative sign points out the direction of the relationship between variables, which can be weak (r = 0.10 to 0.30), moderate (r = 0.40 to 0.6) and strong (r = 0.70 to 1), (DANCEY; REIDY, 2006).

According to Moore and McCabe (2004), there are some conditions to be fulfilled before performing the Person's correlation analysis, such as (i) variables must be quantitative (continuous or discrete), (ii) the observed values must have normal distribution, (iii) the correlation value between X and Y is the same of that between Y and X, and (iv) the correlation value between X and Y does not change when the measurement unit of variables is changed.

Accordingly, before the analysis, the study sought to fulfil the pre-set conditions through the statistical Kolmogorov-Smirnov test, which recorded p-value > 0.05 – indicative of normality, as shown in Table 1.

Table 1 - Kolmogorov-Smirnov test

N		iGG	Efficiency
		56	56
Normal parameters	Mean	.3678	.7501
	Standard deviation	.1490	.1567
Most extreme differences	Absolute	.088	.111
	Positive	.088	.111
	Negative	-.052	-.103
Test' statistics		.088	.111
Significance Sig. (bilateral)		.200	.085

Source: Own elaboration.

An electronic spreadsheet was used to tabulate the variables in data analysis and the statistical software SPSS (Statistical Package for the Social Sciences - version 25) was used for the Person's correlation.

9 Results

Initially, FUs' efficiency analysis was carried out based on the statistical technique known as Data Envelopment Analysis (DEA), by using the inputs and outputs set by the methodology. Subsequently, FUs' maturity level was calculated based on information in their management reports. Finally, the correction between efficiency and FUs' maturity level was carried out.

9.1 Efficiency of Federal Universities in Brazil

FUs' efficiency in applying financial, material and human resources was measured through input-oriented DEA-CCR – evidences are shown in Table 2.

Table 2 - FUs' efficiency level

FUs	Efficiency	FUs	Efficiency	FUs	Efficiency	FUs	Efficiency
UFPB	1.000000	UnB	0.887878	UFPE	0.715476	UFGD	0.615711
UFCG	1.000000	UFC	0.877096	UFTM	0.705123	UFMA	0.615078
UFT	1.000000	UFERSA	0.848869	UFV	0.696051	UFPR	0.602924
UFRA	1.000000	UNILA	0.841138	UFAL	0.695469	UFRJ	0.594317
UFLA	1.000000	UFS	0.817105	UFAC	0.691598	UNIFESP	0.592758
UFSJ	1.000000	UFSM	0.812498	UFAM	0.676819	UFOP	0.580682
UNIRIO	1.000000	UFCA	0.795268	UFMG	0.670631	UFSB	0.577124
UFMS	0.968643	UNIPAMPA	0.778502	UFBA	0.669986	UFOPA	0.569182
UNIR	0.956988	UFMT	0.776908	UFCSPA	0.642621	UFPel	0.553054
FURG	0.946062	UFES	0.763498	UFVJM	0.640842	UNIFESSPA	0.550008
UFSC	0.939086	UFU	0.762805	UFRB	0.637043	UFRR	0.542082
UFRPE	0.933959	UTFPR	0.760175	UFJF	0.633185	UNILAB	0.540325
UFG	0.927394	UFF	0.746832	UFABC	0.617862	UFFS	0.512166
UNIFAP	0.889122	UFRRJ	0.721264	UFPA	0.617105	UFSCar	0.500549

Source: Own elaboration.

As observed in Table 2, of the 56 analyzed FUs, only UFPB, UFCG, UFT, UFRA, UFLA, UFSJ and UNIRIO recorded maximum efficiency scores, and it evidences the ability of these institutions in maximizing outcomes based on resources' minimization. The other FUs have presented efficiency level ranging from 0.968643 to 0.500549, with emphasis on UFSCar, which recorded efficiency score 0.500549 – the lowest one among all FUs. The descriptive statistics of these institutions are shown in Table 3.

Table 3 - Efficiency descriptive statistics

	Mean	Median	Fashion	Variance	Minimum	Maximum

Efficiency	0.75012	0.71837	1.00000	0.025	0.50054	1.00000
Valid N (of the list)	56					

Based on the descriptive statistics evidenced in Table 3, it was possible observing that mean efficiency was 0.75012. This outcome points out that FUs present good efficiency level. It is similar to outcomes recorded by Flegg *et al.* (2003); Afonso and Santos (2004) and Nuintin *et. al.* (2014), who presented mean efficiency scores 0.515, 0.678 and 0.80, respectively.

9.2 FUs' Governance level

FUs' governance level has shown the governance and management ability of public institutions based on Governance and Management, Public Governance, People Management, IT management and Hiring Management indicators (BRASIL, 2018). FUs' governance values are shown in Table 4.

Table 4 - FUs' governance level

FUs	iGG	FUs	iGG	FUs	iGG	FUs	iGG
UFLA	0.81	UFS	0.43	UFPel	0.35	UFPR	0.27
UFMS	0.79	UFT	0.43	UFSM	0.34	UFAL	0.27
UFRPE	0.61	UFMG	0.43	UFABC	0.34	UFCSPA	0.25
UFFS	0.61	UNIR	0.41	UFSJ	0.34	UFAC	0.25
UFPB	0.60	UNIFAP	0.41	UFJF	0.31	UFPA	0.24
UNIPAMPA	0.57	UNIRIO	0.40	UFCG	0.31	UFSC	0.23
UFG	0.56	UNILA	0.40	UFES	0.30	UFRB	0.23
UFRA	0.52	UFCA	0.39	UFVJM	0.30	UFGD	0.21
UFC	0.51	UFPE	0.38	UFF	0.30	UFRJ	0.18
FURG	0.50	UFV	0.38	UTFPR	0.29	UFRR	0.18
UFMT	0.48	UFTM	0.38	UFBA	0.29	UNILAB	0.16
UFERSA	0.47	UFU	0.37	UNIFESSPA	0.29	UFOPA	0.15
UNIFESP	0.47	UFOP	0.36	UFSCar	0.27	UFMA	0.12
UnB	0.44	UFAM	0.35	UFRRJ	0.27	UFSB	0.10

Governance maturity levels of public institutions can be initial, which is subdivided into non-expressive (0% to 14.99%) and initial (15% to 39.99%), intermediate (40% to 70%) and enhanced (70.01% to 100%). Based on data shown in

Table 4, 35 FUs are at initial level, two of them are non-expressive; and 33 FUs are at the "initiating" level. Of the remaining 21 FUs, 19 are at the intermediate level and two (UFLA e UFSM) was at the enhanced level.

9.3 Relationship between governance level and efficiency in applying FUs' resources

The Table 5 show the correlation between governance level and efficiency in applying FUs' resources.

Table 5 - Relationship between governance level and FUs' efficiency

		iGG	Efficiency
iGG	Pearson's Correlation	1	0.594**
	Sig. (2 extremities)		0.000
Efficiency	Pearson's correlation	0.594**	1
	Sig. (2 extremities)	0.000	

**. Significant correlation at level 0.01 (2 extremities).

Source: Own elaboration.

As shown in Table 5, findings in the current research evidence moderate positive correlation of 0.594 between governance level and efficiency in the application of FUs' resources, i.e., the higher the governance level, the higher FUs' efficiency. These evidences corroborate with Kelly (2007), who advocated for the link between governance level and efficiency. They also corroborate the study by Santos and Rover (2019), who stated that public governance practices influence the efficiency in applying public resources in education and healthcare in Brazilian counties.

10 Discussion

The present article approaches public value creation based on the perspective followed by the second axis of the strategic public management triangle suggested by Moore (1995), who addresses the accomplishment of desirable outcomes. Accordingly, public governance and public value generation are the objects of analysis in this investigation. Therefore, assumingly, public governance maturity is linked to public value creation by higher education institutions.

Moore (1995) highlights specific public values: efficiency, effectiveness, socially certified expected outcomes, procedural justice. Thus, Moore's definition of public value can cover input, process, output, and measured outcomes. This article assumed the efficiency of public universities as a measure of Public Value generated for society.

Efficiency was assessed by maximizing the quality of higher education, considering the financial, material, and human inputs available at universities.

The results showed that 12% of the analyzed universities recorded maximum efficiency score, and others UFs present a good level of efficiency, considering the inputs and outputs used in this research to calculate the efficiency. The analysis of Governance maturity levels of public institutions showed that approximately 60% of the FUs are initial level of maturity, shown improvement possibilities in the mechanisms of public governance in the institutions analyzed.

The positive relationship found between efficiency and the level of governance of FUs confirms that the creation of public value by Brazilian federal universities is related with degree of maturity of their public governance. Knowing that efficiency is an element of public value (MOORE, 1995) and is one of the pillars of good governance in the public sector (BRASIL, 2014), the results of this research suggest that the creation of public value can be boosted if its levels of public governance are improved.

11 Final Considerations

The current research was proposed to analyze the relationship between governance level and public value generation in Brazilian federal universities based on their efficiency level. In order to reach such an aim, quantitative research was carried out with 56 federal universities. The study identified FUs' value generation. This proxy was measured based on FUs' efficiency in applying financial, material, and human resources. Based on the results, 12.5% of FUs presented maximum efficiency score, and this finding expresses the ability of these institutions in maximizing results based on resources' minimization.

The study presented FUs' governance levels (IGG) in 2018. This result has shown managers' governance ability in public institutions. The final value was collected from individual evaluation reports made available at TCU's website. Based on the analysis of these reports, it was possible observing that 35 FUs were at initial governance level, 19 were at intermediate level and two were at enhanced stage. Finally, at the last moment, research results have shown moderate positive correlation between governance level and FUs' efficiency in applying their resources.

The positive and statistically significant correlation between governance maturity level and public value generation assessed through efficiency in applying public resources has shown the importance of reinforcing public governance mechanisms in higher education institutions reinforcing their commitment with knowledge production and for the quality of their actions, legitimate their important role in society.

Throughout research construction, some limitations were observed, with emphasis on the non-coverage of all FUs in Brazil. Thus, although the sample encompassed approximately 82% of the total population, the lack of some relevant variables had made it impossible covering all of it. Accordingly, further research is necessary to focus on the analysis of relationship between efficiency and governance based on variables capable of covering all FUs in the country.

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