Institutional factors and the performance of higher education institutions in the accounting sufficiency exam

Factores institucionales y desempeño de las instituciones de educación superior en el examen de suficiencia contable

Fatores institucionais e o desempenho das instituições de ensino superior no exame de suficiência contábil

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Aline Cordeiro Santana, Bruno Barbosa de Souza and Marcos Paulo Tavares Bazet

Abstract

Purpose: Identify the association between institutional factors and student performance in the accounting sufficiency exam.

Methodology: The following institutional factors were considered: administrative category, academic organization, region and allocation of workload to the contents required in the test. The data covers the period between 2017 and 2021, including the Covid-19 pandemic period. Descriptive analysis and statistical tests were used to analyze the results.

Results: There was a decrease in the median approval rate in the results from 2019 to 2021 for all Brazilian regions. Statistical tests revealed that universities in the Southeast region lead in approval rates. The lowest approval rates are concentrated in the northeast region. The course loads of Accounting Applied to the Public Sector, Accounting Theory, Accounting Auditing proved to be significant for performance in the exam. The institutional factors adopted in the present study together explain 47.40% of the variability in the exam approval rate. Other factors that may influence it include socioeconomic, contingent, and external factors.

Contributions of the Study: The theoretical contribution consists in identifying the institutional factors that contribute to students' performance in the accounting sufficiency exam, so that HEIs can develop strategies and review their content to improve their approval rates, considering that the Educational Production Function Theory proposes that the academic result is the consequence of the combination of teaching, student and institutional variables. In practice, the results can be useful for coordinators of undergraduate courses in accounting sciences, who can reflect on the extent to which institutional factors are relevant to be considered in the management of courses, especially in periods of crisis.

Keywords: Institutional Factors; Student Performance; Accounting Sufficiency Exam.

Resumen

Objetivo: Identificar la asociación entre factores institucionales y el desempeño de estudiantes en el examen de competencia contable.

Metodología: Se consideraron los siguientes factores institucionales: categoría administrativa, organización académica, ubicación y asignación de carga de trabajo a los contenidos requeridos en la prueba. Los datos cubren el período comprendido entre 2017 y 2021, incluido el período de la pandemia de Covid-19. Para analizar los resultados se utilizaron análisis descriptivos y pruebas estadísticas.

Resultados: Hubo una disminución en la tasa media de aprobación de los resultados de 2019 a 2021 para todas las regiones brasileñas. Las pruebas estadísticas revelaron que las universidades de la región sureste lideran en aprobaciones. Las tasas de aprobación más bajas se concentran en la región Norte. La carga de cursos de Contabilidad Aplicada al Sector Público, Teoría Contable, Auditoría Contable resultó ser significativa para los resultados de los estudiantes. Los factores institucionales adoptados en el presente estudio explican en conjunto el 47,40% de la

Aline Cordeiro Santana, Bruno Barbosa de Souza and Marcos Paulo Tavares Bazet

variabilidad en la tasa de aprobación de exámenes. Otros factores que pueden influir son los factores socioeconómicos, de contingencia y externos.

Contribuciones del Estudio: El aporte teórico radica en identificar los factores institucionales que contribuyen al desempeño de los estudiantes en el examen de competencia, para que las IES puedan desarrollar estrategias y revisar sus contenidos para mejorar sus índices de aprobación, considerando que la Teoría de la Función de Producción Educativa propone que el resultado académico es resultado de la combinación de variables docentes, estudiantiles e institucionales. En la práctica, los resultados pueden ser útiles para los coordinadores de cursos de ciencias contables, quienes pueden reflexionar sobre en qué medida los factores institucionales son relevantes para ser considerados en la gestión de los cursos, especialmente en períodos de crisis.

Palabras clave: Factores Institucionales; Desempeño Estudiantil; Examen de Suficiencia Contable.

Resumo

Objetivo: Identificar a associação entre fatores institucionais e desempenho dos discentes no exame de suficiência contábil.

Metodologia: Foram considerados os seguintes fatores institucionais: categoria administrativa, organização acadêmica, localidade e destinação de carga horária aos conteúdos exigidos no teste. Os dados compreendem o período entre 2017 e 2021, incluindo o período de pandemia de Covid-19. Utilizou-se análise descritiva e testes estatísticos para analisar os resultados.

Resultados: Houve uma queda da taxa mediana de aprovação nos resultados de 2019 a 2021 para todas as regiões brasileiras. Os testes estatísticos revelaram que as universidades da região Sudeste lideram as aprovações. As menores taxas de aprovação se concentram na região Norte. As cargas horárias das disciplinas de Contabilidade Aplicada ao Setor Público, Teoria da Contabilidade e Auditoria Contábil mostraram ser significativas para o desempenho no exame. Os fatores institucionais adotados no presente estudo em conjunto explicam 47,40% da variabilidade da taxa de aprovação no exame. Outros fatores que podem influenciar são os socioeconômicos, contingenciais e externos.

Contribuições do Estudo: A contribuição teórica reside na identificação dos fatores institucionais que contribuem para o desempenho dos discentes no exame de suficiência, de maneira que as IES possam elaborar estratégias e rever seus conteúdos para melhor os seus índices de aprovação, considerando que a Teoria da Função de Produção Educacional propõe que o resultado acadêmico é fruto da combinação de variáveis docentes, discentes e institucionais. Na prática, os resultados podem ser úteis para coordenadores de cursos de graduação em ciências contábeis, que podem refletir sobre como os fatores institucionais são relevantes a serem considerados na gestão dos cursos, incluindo períodos de crise.

Palavras-chave: Fatores Institucionais; Desempenho Discente; Exame de Suficiência Contábil.

1 Introduction

The training of accounting professionals takes place in Higher Education Institutions (HEIs), which aim to provide the job market with graduates who are prepared for the profession. These institutions focus on developing skills and competencies that extend beyond technical knowledge, offering a multidisciplinary perspective (Lousada & Martins, 2005). To ensure that Brazilian society has professionals who can demonstrate a moderate level of knowledge necessary for the job market, the Federal Accounting Council (CFC) established the accounting sufficiency exam. This exam is designed by the CFC to certify that graduates have acquired the essential knowledge during their education to practice the profession (CFC, 2015).

Get approval in the accounting sufficiency exam is a requirement for obtaining a professional license as an accountant. Consequently, HEIs have adapted to ensure their students get approval the test, as it is essential for registering as an accountant and for employment (Sena & Sallaberry, 2021). However, an analysis of the exam results reveals significant failure rates. Between 2017 and 2021, the average approval rate was only 30.80%.

Given this context, the qualified preparation of future accounting professionals becomes a challenge for HEIs. This requires students to develop personal and professional abilities, skills, competencies, and values, rather than merely memorizing content. It is important for the exam to include questions that encourage analysis, critical thinking, and creativity, contributing to a comprehensive education that encompasses management and decision-making aspects, rather than being confined to accounting techniques. HEIs should prioritize an education that fosters an analytical, critical, and innovative mindset, going beyond the technical competencies and skills of the accounting profession (Pinheiro et al., 2013).

To achieve this goal, it is necessary to analyze the various factors that can influence institutions in training students and their subsequent performance on tests (Amaro & Beuren, 2017). To understand student academic performance, characteristics related to HEIs, faculty, and the students themselves are generally analyzed (Sousa et al., 2019).

The curriculum is also an institutional factor that can affect academic performance. It is organized through the Course Pedagogical Project, a document that facilitates the planning, organization, and curricular structure of a course, enabling the development of skills and competencies according to the profession's needs (Silva et al., 2017). The disciplines that make up the curriculum depend on the educational philosophy that underpins curriculum planning (Santos & Coimbra, 2018).

According to the Educational Production Function Theory (EPFT), adapted from economics to education, HEIs transform inputs, related to student, faculty, and institutional variables, into outputs, represented by student learning (Rodrigues et al., 2016). This theory, which measures educational productivity, identifies variables related to students, HEIs, and faculty as inputs, with the final product being academic performance. Academic performance is measured, for instance, by the results on standardized tests (Hanushek & Woessmann, 2014).

The accounting sufficiency exam has been the subject of recent research, which has considered institutional factors as possible determinants of academic performance (Marçal et al., 2019; Barroso et al., 2020; Silva & Cavalcante, 2021). Given the exam's significance in the history of the profession, in which approval it is necessary to be deemed fit to practice and to register with the Regional Council, its importance is clear (Silva et al., 2024). It is a fundamental tool for ensuring the security of users of accounting information (Lima et al., 2022).

Aline Cordeiro Santana, Bruno Barbosa de Souza and Marcos Paulo Tavares Bazet

To this end, it is necessary to expand this literature, encompassing other institutional aspects that may also be related to performance in the sufficiency exam, after the start of data dissemination in 2017. Given this context, the question that guides the study is: **What is the association between institutional factors and student performance in the accounting sufficiency exam**? Therefore, the general objective is to identify the association between institutional factors and IES approval rates in the accounting sufficiency exam.

With this identification, it is possible to understand the points that can be improved for HEIs to obtain a higher approval rate of students in the exam. Barroso et al. (2020) comment that research that relates the determinants of student performance with a focus on the accounting sufficiency exam is still not seen with the same frequency as those focused on student performance measured by Enade.

This research aims to identify the relationship between institutional factors and student performance on the accounting sufficiency exam, with an analysis based on the Educational Production Function Theory. The following institutional factors were considered: administrative category, academic organization, location, and allocation of course hours to the content required by the test. Data provided by the CFC were used, which include information about the HEIs that participated in the exam, their respective results, the region where they are located, the type of academic organization, and the administrative category. The websites of the HEIs were also consulted to locate the course's pedagogical project or curriculum matrix to collect information on the hours allocated to disciplines related to the exam content. HEIs whose students took the accounting sufficiency exam between 2017 and 2021 were considered.

The results of this research are expected to benefit HEIs and their course coordinators by elucidating how institutional factors can influence student performance on the accounting sufficiency exam. Specifically, it examines the relationship between the alignment of course components and their respective hours with the discipline required in the exam, providing a better understanding of the variables that influence student performance expands the discussion around improving accounting education in the country (Araújo et al., 2013).

For society, a higher approval rate on the sufficiency exam results in an increase in the number of professionals licensed to practice accounting, a profession essential in various market segments. This analysis can also help students understand how well their education aligns with the test requirements, encouraging them to seek the necessary improvements to achieve satisfactory performance and make better choices when selecting HEIs.

It is the responsibility of HEIs to enhance the training of future accountants. To this end, they should develop strategies that maximize strengths and minimize weaknesses to improve student performance (Silva & Cavalcante, 2021). Thus, the results of this research can provide course coordinators with the insights needed to make curriculum improvements in HEIs. This could lead to a higher approval rate on the sufficiency exam and, consequently, an increase in the number of professionals licensed to practice accounting, which is crucial for various market segments.

Aline Cordeiro Santana, Bruno Barbosa de Souza and Marcos Paulo Tavares Bazet

2 Literature Review

2.1 Educational Production Function Theory

In economics, production involves processing a set of inputs through a transformation process, resulting in final products (outputs) (Kumbhakar, 2011). To achieve better results, organizations must choose the inputs, quantities, and production processes that will yield their outputs (Rodrigues et al., 2016). The selection of input and output variables aims to maximize the economic outcome of organizations (White, 2013).

Applying this function to the educational field relates inputs, generally tied to the teaching and learning environment, to outputs defined in terms of test scores (Deutsch et al., 2013). In the context of the Educational Production Function Theory (EPFT), student training in HEIs is similar to the production process in business organizations, where teaching tools and decisions regarding the development of knowledge, competencies, and skills are based on the needs of the work environment the student will enter after graduation (Silva & Cavalcante, 2021).

Regarding the adaptation of this economic theory to education, Hanushek and Woessmann (2011) consider different inputs of the educational process and how they affect educational indicators, which can be represented as follows:

$$T_{it} = f(F^{(t)}, P^{(t)}, R^{(t)}, I^{(t)}, A_i) \tag{1}$$

In the equation, T represents the outcome of the educational process, measured, for example, by academic performance on tests; F relates to student variables such as age, gender, school grade, and family background; P represents peer effects, such as the learning capacity of classmates and the teaching pace used by the teacher; R includes school resources, such as teacher salaries; I encompasses characteristics related to HEIs and the school system, such as location and whether the institution is public or private; and A is the individual student's ability (Hanushek & Woessmann, 2011).

The equation employs variables related to students and their families, the school system, and the characteristics of educational institutions that influence student outcomes. However, there is no consensus on which variables influence this output (Diniz & Corrar, 2011). The choice of performance indicators for measuring the productive efficiency of HEIs should be made carefully, given the diversity of inputs and outputs in the educational sector. It is also important to analyze the conditions and environments in which institutions operate, as these can affect their performance outcomes. Factors such as the economic influence of the location, available financial resources, and whether the institutions are public or private, among others, can intervene (Costa et al., 2012).

Regarding the inputs classified by Hanushek and Woessmann (2011), this study considers categories related to schools and institutions, such as location (region where the HEI is situated), administrative category (public or private education), academic organization of the HEI (University, College, University Center, Higher Education Institute), and, concerning the

exam for knowledge assessment (output), it is considered the student performance on the accounting sufficiency exam.

2.2 CFC Sufficiency Exam: Characterization and Student Performance

Through Resolution No. 853 of 1999, the Federal Accounting Council (CFC) made the sufficiency exam mandatory for professional registration with the Regional Accounting Councils (CRCs). However, this requirement was abolished by a court ruling in 2005 (Gonzales & Filho, 2017). Law No. 12.249, of June 11, 2010, reinstated this requirement, effective from 2011. To register for the exam, candidates should be in their final year of an accounting degree or have already graduated with a degree in accounting.

The result of the sufficiency exam is one of the mechanisms available to HEIs to improve the quality of education (Bugarim et al., 2014). The exam ensures that students who get approval possess the knowledge and skills implied by their diploma (Miranda et al., 2017). Despite this, students generally perform poorly on the exam.

Several factors contribute to the lack of preparation among some students (Figueiredo et al., 2017), including work routines - as many students work and have less time to study - and family-related aspects, such as motivation to study or being parents, which reduces their study time (Silva & Barbosa, 2018). The combination of school-related aspects, the teaching staff, and the characteristics of the students and their families all influence student test performance, reinforcing the principles of the Educational Production Function Theory (EPFT) (Hanushek & Woessmann, 2011).

Some views on the exam suggest it enhances professional value and helps select more qualified professionals (Galvão, 2016). However, there is a need to better align the test with the realities of the business world (Galvão, 2016). Students believe that teachers need to discuss this topic more thoroughly in the classroom (Silva & Barbosa, 2018), given its importance as a qualifying exam for assessing the capabilities of professionals entering the job market.

The subjects covered by the CFC for the sufficiency exam are listed in Table 1.

Table 1

Contents required in the accounting sufficiency exam

Subject	Number of Questions
Accounting Audit	2
Accounting Applied to the Public Sector	3
Cost Accounting	4
General Accounting	17
Managerial Accounting	2
Controllership	1
Legislation and Professional Ethics	4
Applied Portuguese Language	2
Financial Mathematics and Statistics	2
Law and Applied Legislation	3
Accounting Expertise	2

Brazilian Accounting Standards	4
Accounting Theory	4
Total	**50**

Source: *Adapted from Federal Accounting Council (CFC)*

In Table 1, it is evident that the most frequently tested subject in the exam is General Accounting, which encompasses concepts and practices integral to all branches of accounting (Sena & Sallaberry, 2021). It is believed that among the required contents, the subjects that demand the most dedication are Cost Accounting, Accounting Standards, General Accounting, and Auditing (Silva & Barbosa, 2018). However, there are indications that the content tested in the exam is not aligned with the expectations for accounting education (Pinheiro et al., 2013). This highlights the need for educational institutions to prioritize a curriculum that fosters analytical, critical, and innovative thinking, aligning with the technical skills and competencies required of accounting professionals (Pinheiro et al., 2013).

2.3 Institutional Factors

Regarding the factors influencing student performance, it is understood that these may be related to the students' academic trajectory, the quality of the faculty, and institutional variables such as location, being public or private, and physical infrastructure (Hanushek & Woessmann, 2014). Improvements in any of these areas can positively impact the quality of education and, consequently, student performance on standardized tests.

Several institutional factors can influence students' performance on the sufficiency exam. Marçal et al. (2019) investigated whether the performance of accounting students on the CFC sufficiency exam varies according to the characteristics of Brazilian higher education institutions (HEIs), proposing three possible discrepancies for performance: administrative categories, academic organizations, and demographic regions.

Marçal et al. (2019) found that, in terms of administrative categories, public HEIs had a higher average approval rate on the sufficiency exam compared to private HEIs. Regarding academic organizations, universities topped the approval ranking, but there was no statistically significant difference compared to university centers, which occupied the second position. Concerning demographic regions, the South region showed the best results. However, the Southeast region, which ranked second, was not statistically different from the leading region (Marçal et al., 2019).

Supporting these findings, Paines and Ott (2018) examined the performance of graduates from the accounting program and found that graduates from the South region generally had a higher average approval rate on the exams. They concluded that there is a difference in knowledge levels among accounting graduates and that the performance of HEIs in the South and Southeast regions positively contributed to the overall approval rate on the CFC sufficiency exam.

Silva and Cavalcante (2021) found that the best results were recorded in courses at federal HEIs, while the worst results on the exam were seen in courses at HEIs in the North region. This confirms that the best performances are in federal universities in the South and Southeast, while the North region shows the poorest results. Regarding the alignment of HEI

Aline Cordeiro Santana, Bruno Barbosa de Souza and Marcos Paulo Tavares Bazet

curricula with the content required for the sufficiency exam, it is known that, for the discipline of General Accounting, there was no correlation between the allocation of more or less class hours to this discipline and the performance of the respective students on the test.

Studies linking the determinants of performance with a focus on the sufficiency exam are still incipient (Barroso et al., 2020). Therefore, despite some findings in the literature on the subject, there is a need for further investigation into the institutional factors related to performance on the exam. Thus, this study aims to reinforce these findings and add variables to this discussion.

3 Methodological Procedures

The main objective of this research is to identify the association between institutional factors and the approval rates of higher education institutions (HEIs) on the accounting sufficiency exam. In this study, documents related to the pedagogical project of the course, curricular matrices, or publicly accessible curricular grids are available on the official websites of the institutions. From the CFC website (https://cfc.org.br/), it was possible to collect the exam announcements from 2017 to 2021 to verify the required content. Additionally, the CFC website provides the number of questions asked by content area, approvals by HEI, and data by region.

The sample population refers to public and private higher education institutions that offer the accounting course and participated in the editions of the accounting sufficiency exam from 2017 to 2021. These are organized in the form of universities, colleges, university centers, and higher education institutes. The data by HEI has been available on the CFC website since 2017, which justifies the starting period for the data treatment in this research.

A total of 278 HEIs that provided access to their course pedagogical projects, curricular matrices, or grids were selected. The sample selection criteria included participating in all exam editions from 2017 to 2021 and having at least ten participants in each edition. After applying these criteria, the final sample consisted of 142 HEIs: 40 from the Northeast, 39 from the Southeast, 28 from the South, 18 from the North, and 17 from the Midwest, as shown in Table 2:

Table 2
Distribution of HEIs in the research sample by Brazilian Region

Brazilian Region	Academic Organization	Number	%
South Region	Universities	21	14,79%
	University Centers	2	1,41%
	Faculties	4	2,82%
	Higher Education Institutes	1	0,70%
South Region Total		**28**	
Southeast Region	Universities	18	12,68%
	University Centers	16	11,27%
	Faculties	5	3,52%
	Higher Education Institutes	0	0,00%
Southeast Region Total		**39**	

Midwest	Universities	4	2,82%
	University Centers	4	2,82%
	Faculties	7	4,93%
	Higher Education Institutes	2	1,41%
Midwest Total		**17**	
Northeast	Universities	14	9,86%
	University Centers	4	2,82%
	Faculties	19	13,38%
	Higher Education Institutes	3	2,11%
Northeast Total		**40**	
North	Universities	5	3,52%
	University Centers	4	2,82%
	Faculties	8	5,63%
	Higher Education Institutes	1	0,70%
North Total		**18**	
Total		**142**	**100%**

Source: *Research Data*

The statistics on participants institutions and approval rates for the accounting sufficiency exam by HEI from 2017 to 2021 are available on the CFC website, along with the exam announcements to verify the content required in the tests. To characterize the sample, an initial descriptive analysis of the data was conducted. Excel® was used to calculate the approval percentage for each year and the average from 2017 to 2021, by each HEI, demographic region, type of academic organization, and administrative category.

Out of the 142 HEIs, 87 provided only the curricular grid for public access, 45 provided the pedagogical project, and 10 provided the curricular matrix. The curricular grid only includes the name of the discipline and the number of hours allocated, without specifying the content covered. Thus, the interpretation was based solely on the discipline names. To minimize issues related to the allocation of hours to the disciplines covered in the test, the exam announcements, which specify the content each discipline encompasses, were consulted. This allowed for an assessment of whether the subject matched the content outlined in the accounting sufficiency exam announcements.

Table 3
Classification of content required in the accounting sufficiency exam according to the HEI curriculum

Subjects Covered in the Exam	Content Covered in HEI Curricula
General Accounting	Accounting Basics Accounting I, II, III, IV Introductory Accounting Intermediate Accounting Advanced Accounting Structure of Financial Statements Fundamentals of Accounting Accounting Statements

Aline Cordeiro Santana, Bruno Barbosa de Souza and Marcos Paulo Tavares Bazet

	Bookkeeping of Financial Statements Business Accounting Accounting Reports Structure and Preparation of Financial Statements
Cost Accounting	Cost Accounting I and II Cost Accounting Practices Cost Fundamentals
Accounting Applied to the Public Sector	Accounting Applied to the Public Sector Public Accounting I and II Accounting and Public Budget Government Accounting
Managerial Accounting	Analysis of Financial Statements Management Accounting I and II Cost Management and Analysis Financial Cost Analysis
Controllership	Controllership Business Budget Strategic Planning Budget Control Management/Accounting Information Systems Information Management and Decision-Making Process Financial and Budgetary Administration
Law and Applied Legislation	Business Law Tax Law Labor Law Public and Private Law Fundamentals of Law Introduction to the Study of Law Social and Labor Legislation Tax Legislation Business Legislation Labor Routines Applied to Accounting Labor Legislation Commercial Law
Financial Mathematics and Statistics	Financial Mathematics I and II Statistics I and II Quantitative Methods Applied to Accounting
Accounting Theory	Accounting Theory Evolution of Accounting Thought Conceptual Framework
Legislation and Professional Ethics	Professional Legislation Professional Ethics Legislation and Professional Ethics Philosophy and Ethics Society and Ethics
Brazilian Accounting Standards	Brazilian Accounting Standards
Accounting Audit	Audit I and II Accounting Audit Independent Audit
Accounting Expertise	Expertise I and II

Aline Cordeiro Santana, Bruno Barbosa de Souza and Marcos Paulo Tavares Bazet

	Accounting Expertise
Applied Portuguese Language	Portuguese Language
	Spelling and Text Interpretation
	Interpretation and Production of Texts

Source: *Research Data*

The discipline of Brazilian Accounting Standards, in the curricula of HEIs, was contained in the discipline of General Accounting, Accounting Theory or, even, in Accounting Auditing. However, in these circumstances, the hours of this subject were not considered in the analysis, due to the impossibility of calculating the allocation of hours for this specific content. In cases where the curriculum detailed the subject and corresponding hours, the calculation was carried out normally. For statistical treatment of the data, statistical tests were carried out using the R software, as shown in Table 4:

Table 4
Description of the tests used for the variables analyzed

Variable	Test
Administrative Category	ANOVA Test
	ShapiroWilk Test
	Wilcoxon Test
Academic Organization	ANOVA Test
	Shapiro-Wilk Test
	Kruskal-Wallis Test
	Dunn Test
Brazilian Region	ANOVA Test
	Shapiro-Wilk Test
	Kruskal-Wallis Test
	Dunn Test
Workload	Multiple Linear Regression
COVID-19	ANOVA Test
	Shapiro-Wilk Test
	Wilcoxon Test
Online Application of the Exam	ANOVA Test
	Shapiro-Wilk Test
	Wilcoxon Test

Source: *Research Data*

To describe the relationship between administrative category (public and private), academic organization (University, College, University Center, Higher Education Institute), the region where the institutions are located, and student performance in the accounting sufficiency exam, and to identify the approval rates during the pandemic and student performance in the first online edition of the exam in 2020, it was necessary first to use Analysis of Variance (ANOVA) and Shapiro-Wilk test to check if the data had a normal distribution.

The research sample data, according to Shapiro-Wilk test results, did not follow a normal distribution, which ruled out the use of ANOVA for further testing. For cases with two variables in the experiment, the Wilcoxon test was used, a non-parametric method that compares two samples to determine if there are significant differences between them (Bussab & Morettin, 2010).

For data related to academic organization and demographic region, which have four and five variables respectively, Kruskal-Wallis test and Dunn test were used. Kruskal-Wallis test is a non-parametric test that compares three or more independent samples to determine if there is a statistically significant difference in at least two of them. Dunn test is then used to identify which groups show the differences identified by Kruskal-Wallis test (Hoffmann, 2016).

In examining the relationship between the workload for each subject in the institutions' curricula and the approval rates in the exam, Multiple Linear Regression was employed. This analysis quantifies the relationship between variables, allowing for an understanding of which subjects had the greatest impact on academic results in the exam (Hoffmann, 2016).

For all statistical tests, ANOVA and Shapiro-Wilk tests were first conducted at a 95% confidence level, showing that the sample residues did not follow a normal distribution (p-value < 0.000001). Therefore, appropriate statistical tests were employed based on the data. When comparing the years, Kruskal-Wallis test was used, showing a significant difference in the median approval percentage between the years the exam was conducted (p-value < 0.00001).

4 Results and Analysis

Table 5 presents Dunn test result, conducted to compare the median approval rates over the different years analyzed. This statistical test was applied to determine if there are significant differences between the medians of the approval rates across the years, using a 5% significance level.

Table 5
Dunn test result in the years analyzed

Years	Median Approval Rate
2017	28,57%[a]
2018	38,51%[b]
2019	38,38%[b]
2020	29,17%[a]
2021	23,61%[a]

Note: Years that have at least one letter in common indicate statistically equal median approval rates using Dunn Test at 5% significance.
Source: *Research Data*

The letters next to the median approval percentages in Table 5 indicate whether there is a statistical difference between the medians. Identical letters mean no difference, while different letters indicate a statistical difference between the medians. According to Dunn test result, 2017 did not show a statistically significant difference compared to 2020 and 2021. However, 2018 and 2019 showed statistically significant differences compared to 2017, 2020, and 2021, with higher median approval percentages. There was no statistical difference in the median approval rates between 2018 and 2019.

The results in Table 5 reveal a low median approval rate, highlighting the findings of Figueiredo et al. (2017) regarding the lack of student preparedness. This supports the conclusion of Silva and Barbosa (2018) that more focused discussions on this topic are needed in classrooms. Additionally, during the COVID-19 pandemic years (2020 and 2021), the median

approval rate did not show a statistically significant difference compared to 2017. However, compared to 2018 and 2019, the median approval rate was statistically lower during the pandemic years.

To examine the differences between public and private institutions, the Wilcoxon test was conducted to determine if the averages of the two groups differ statistically, as shown in Table 6.

Table 6

Wilcoxon test result by administrative category

Administrative Category	Average Approval Rate	p-value
Public Institutions	55,34%[a]	<0,000001
Private Institutions	28,96%[b]	

Note: Administrative Categories that have at least one letter in common indicate statistically equal average approval rates using the Wilcoxon Test at 5% significance.
Source: *Research Data*

The result obtained from Wilcoxon test indicates that the average approval percentages from 2017 to 2021 in the analyzed sample show a statistically significant difference (p-value < 0.00001), demonstrating that the approval rate in the accounting sufficiency exam is higher in public administrative category institutions compared to private ones.

To verify the statistical difference between academic organizations, Kruskal-Wallis test was used. It was observed that the sample has different approval averages (p-value < 0.00001). Dunn test was then used to identify which groups are different from each other, as shown in Table 7.

Table 7

Dunn test result by academic organization

Academic Organization	Average Approval Rate
Universities	48.57%[a]
University Centers	30.10%[b]
Faculties	22.88%[c]
Higher Education Institutes	20.16%[c]

Note: Academic Organizations that have at least one letter in common indicate statistically equal average approval rates using Dunn Test at 5% significance.
Source: *Research Data*

In agreement with Marçal et al. (2019) on the differences in results varying according to organizational characteristics, Dunn test indicated that the average approval percentages of universities are higher than those of other academic organizations. University centers achieve better rates than faculties and higher education institutes. The last two groups did not show statistically significant differences between themselves.

To verify the statistical difference in average approval percentages among the Brazilian regions in the analyzed sample, Kruskal-Wallis test was conducted, indicating a significant difference in the average approval rates across the exam years (p-value < 0.00001). Therefore,

Aline Cordeiro Santana, Bruno Barbosa de Souza and Marcos Paulo Tavares Bazet

Dunn test was used to identify which groups diverged from the average of the others. Table 8 shows the result of Dunn test:

Table 8

Dunn test result by Brazilian Region

Brazilian Region	Average Approval Rate
South	48.01%[a]
Southeast	40.83%[b]
Midwest	35.12%[c]
Northeast	34.74%[c]
North	24.33%[d]

Note: Regions that have at least one letter in common indicate statistically equal average approval rates using the Dunn Test at 5% significance.

Source: *Research Data*

Corroborating the findings by Paines and Ott (2018), it is observed that the average approval percentage in the southern region is statistically higher than in other regions. The southeastern region achieves better results than the central-western, northeastern, and northern regions. The averages for the central-western and northeastern regions do not show a statistically significant difference. Additionally, these regions had higher averages than the northern region, which exhibited the worst results among all regions, agreeing with the findings of Silva and Cavalcante (2021).

Previous studies on this topic, along with the results found in this research, converge on a trend where universities, public institutions, and those located in the southern and southeastern regions achieve higher approval rates in the accounting sufficiency exam. These institutional factors are linked to the factors of educational institutions, represented by the letter "I" in the educational production function, which can influence student performance in tests (Hanushek & Woessmann, 2011).

Regarding the socioeconomic factors of the region, Sprenger et al. (2019) and Fagundes et al. (2020) highlight the Human Development Index (HDI), which combines factors related to income, longevity, and education, as a significant variable correlated with the approval rate in the accounting sufficiency exam in their studies. Sprenger et al. (2019) also emphasizes regional per capita income and Gross Domestic Product (GDP) as significant factors explaining student performance in the accounting sufficiency exam.

These factors may explain the superior performance of the southern and southeastern regions. According to the Brazilian Institute of Geography and Statistics (IBGE, 2020), the states of São Paulo, Rio de Janeiro, and Minas Gerais (Southeast), and Rio Grande do Sul and Paraná (South) represent the largest contributions to the Brazilian GDP from 2002 to 2020. The states with the lowest contributions are Tocantins, Amapá, Acre, and Roraima, all located in the northern region.

In addition to regional economic factors, the curriculum of HEIs can influence student performance in standardized tests. According to Hanushek (1979), the pedagogical curricula of HEIs represent inputs in the educational production function, and their design and implementation in the classroom can impact student performance in exams.

To understand the relationship between the allocation of course hours by HEIs to the contents covered in the accounting sufficiency exam and student performance in the test, a Multiple Linear Regression was conducted. The analysis also considered other variables related to the results obtained in the curriculum analysis, such as region, academic organization, and administrative category, as shown in Table 9.

Table 9
Multiple linear regression analysis of curricular components

Variable	Estimate	p-value
Intercept	3.440e-01	< 2e-16***
Accounting Applied to the Public Sector	3.823e-04	1.84e-05***
Accounting Theory	4.580e-04	0.000146***
Accounting Audit	6.440e-04	1.11e-11***
Accounting Expertise	-1.862e-03**	< 2e-16***
Applied Portuguese Language	-4.727e-04**	6.22e-07***
Region - Northeast	-2.581e-02**	0.015788*
Region - North	-1.048e-01**	< 2e-16***
Region – Southeast	4.257e-02	0.000198***
Region – South	5.230e-02	2.42e-05***
Academic Organization - Faculty	-7.553e-02**	2.80e-15***
Academic Organization – Higher Education Institute	-7.561e-02**	1.55e-06***
Academic Organization - University	3.740e-02	0.000449***
Category - Public	1.822e-01	< 2e-16***

**: Negative coefficients indicate an inverse relationship with approval rate.
*: Significant correlation at the 0.05 level.
***: Significant correlation at the 0.01 level.
Adjusted R²: 0.71.
Source: *Research Data*

According to the results, the disciplines that are related to student performance on the accounting sufficiency exam are Accounting Applied to the Public Sector, Accounting Theory, Accounting Auditing, Accounting Expertise, and Applied Portuguese Language. The Multiple Linear Regression considered, along with the discipline analysis, factors that influence the results, such as region, academic organization, and administrative category. The multiple correlation coefficient (R^2) was 0.71, meaning that the combination of these factors explains 71% of the results obtained in the sufficiency exam by the HEIs in the research sample.

The allocation of course hours to the subjects of Accounting Applied to the Public Sector, Accounting Theory, and Accounting Auditing indicates a direct relationship with the approval rate. In other words, the more course hours allocated to these subjects, the higher the student approval rates tend to be in the accounting sufficiency exam. In parallel, the southern region allocated the most course hours to Accounting Applied to the Public Sector and Accounting Auditing in the analyzed years compared to other regions. Additionally, it is the region with the highest approval rates in the exam. For the subject of Accounting Theory, the northern region allocates the most hours, followed by the southern region.

Conversely, the subjects of Accounting Expertise and Applied Portuguese Language have an inverse relationship with student performance on the test. That is, the more course hours allocated to these subjects, the lower the approval rates in the sufficiency exam tend to be. The subject of Accounting Expertise has the most course hours allocated in the curricula of HEIs located in the northeastern region, which only surpassed the northern region's average approval percentage in the analyzed years. For the subject of Applied Portuguese Language, the central-western region allocates the most hours. The southern region, which has the highest approval rates, allocates the least course hours to this subject.

Additionally, the HEIs' curricula reflect a profile of accountants geared towards managerial areas, with a focus on subjects related to agribusiness, which is an important sector for the country's economy, as well as environmental accounting, organizational psychology, sociology, and information technology. These contents go beyond the content required in the accounting sufficiency exam.

To analyze the results of the accounting sufficiency exam during the COVID-19 pandemic, the editions 2020/2, 2021/2, and 2021/2 were considered. The first edition of 2020 was analyzed separately because it was conducted online, which could affect the interpretation of the data. To analyze the results during COVID-19, Wilcoxon Test was used, considering the approval medians, to check if there is a difference in the medians of the analyzed groups, as shown in Table 10.

Table 10
Wilcoxon test result considering the Covid-19 period

COVID-19	Median Approval Rate	p-value
No	33,33%	<0,000001
Yes	25,16%	

Source: *Research Data*

The result of the Wilcoxon test reveals a statistically significant difference in the approval medians of students before and during the COVID-19 pandemic period (p-value < 0.000001). Thus, it is evident that the median approval rates before the pandemic are higher than those during the COVID-19 affected period. In the 2020/2, 2021/1, and 2021/2 editions, the northern region had significantly lower approval rates than other regions. In the 2021/1 edition, the northern region of the sample achieved only a 10.98% approval rate, while HEIs in the southern region approved an average of 37.25% of the students during the same period.

Hanushek and Woessmann (2014) discuss that the location of HEIs and students' access to technological and economic resources are inputs in the Educational Production Function Theory (TFPE) that can impact student performance in standardized tests, as observed in this research. Additionally, during the pandemic, the interaction between teachers and students was hindered by the online environment, and many students kept their cameras turned off during classes, as reported by Alves et al. (2021).

To verify if the results of the 2020/1 edition of the exam, conducted online, differ from the others, the Wilcoxon Test was applied to identify if there is a statistically significant difference between the medians of the two groups, as shown in Table 11.

Table 11

Wilcoxon test result considering the online and in-person exam

Exam	Median Approval Rate	p-value
In Person	30,77%	<0,000001
Online	42,86%	

Source: *Research Data*

The result of Wilcoxon test indicate a statistically significant difference in the medians of the analyzed groups (p-value < 0.000001). Therefore, the median approval percentage in the 2020/1 edition, conducted online, was higher than in the editions conducted in person (2017/1, 2017/2, 2018/1, 2018/2, 2019/1, 2019/2, 2020/1, 2021/1, and 2021/1). This result raises questions about the effectiveness of the online exam, as the average approval rates in the second edition of 2020, across all geographic regions in the sample, dropped by more than 10%.

Similarly, the results obtained by all HEIs that participated in the first edition of 2020, according to CFC (2020), show an average approval rate of 38.19%. In the second edition of 2020, conducted in person, this rate decreased to 24.26%. The 2019/2 edition had an average approval rate of 33.64%, which is still lower than the rate achieved in the first edition of 2020, even with 465 candidates disqualified during 2020/1 due to irregularities.

5 Final Considerations

The main objective of this research was to identify the association between institutional factors and the approval rates of HEIs in the accounting sufficiency exam, based on the Educational Production Function Theory. The study considered the years 2017 to 2021, including the period affected by the COVID-19 pandemic. The institutional factors analyzed were the administrative category of the HEI, academic organization, demographic region, and curriculum. Statistical tests were employed to analyze these variables in relation to student performance on the accounting sufficiency exam.

According to the educational production function, factors related to the location of the HEI, administrative category, form of academic organization, and curriculum can impact student performance in tests. The research results, along with previous research on the topic, highlight that public universities located in the South and Southeast regions achieve the highest performance on the accounting sufficiency exam. By demonstrating the superior performance of the South region, this study can contribute to educational policies aimed at improving student outcomes in economically disadvantaged regions, such as the North.

Considering that the variables studied - administrative category, academic organization, and location of the HEI - are not subject to change, course coordinators and professors can include exam questions in their classes from the early stages of the course to better prepare students. Additionally, instructors can encourage discussions on practical topics that stimulate critical thinking.

Regarding the allocation of discipline hours to the content required for the accounting sufficiency exam, multiple linear regression analysis revealed that the subjects of Accounting Applied to the Public Sector, Accounting Theory, Accounting Auditing, Accounting Expertise, and Applied Portuguese Language were significant in explaining student performance. The first three subjects showed a direct relationship with approval rates, meaning that the more hours

Aline Cordeiro Santana, Bruno Barbosa de Souza and Marcos Paulo Tavares Bazet

allocated to these subjects, the higher the student approval rates. In contrast, Accounting Expertise and Applied Portuguese Language showed an inverse relationship with approval rates.

The results during the COVID-19 pandemic showed an increase in average approval rates for the online exam compared to previous in-person editions. Furthermore, the average approval rate was statistically lower during the pandemic for in-person exams, excluding the first edition of 2020. This raises questions about the possibility of unauthorized assistance during the online exam, as the average approval rate dropped by 13.47% in the second edition of 2020 compared to the first edition of 2020, and by 18.75% compared to the first edition of 2021.

Based on these results, course coordinators may need to review the curriculum planning, to achieve higher approval rates on the accounting sufficiency exam, considering the workload of the disciplines that proved to be relevant to explain the student's result in the exam. Students should seek the necessary preparation based on the analysis of course hours and subjects. Prospective students might choose HEIs with better approval rates based on the relevant institutional characteristics identified in this research.

A limitation of this study is that out of the 142 HEIs analyzed, 87 (61.26%) only provided public access to their curricular matrices, that only includes the subject names and allocated hours. Due to it, the interpretation of content and hour allocation was based on the subject names, which may introduce bias due to incomplete information. Additionally, some HEIs did not make their pedagogical curriculum publicly available, did not participate in all exam editions from 2017 to 2021, or had fewer than ten participants per edition, reducing the sample size.

Future studies might consider additional factors to explain student performance on the accounting sufficiency exam, such as regional economic factors related to HDI, per capita income, and GDP. Other institutional variables, such as the Preliminary Course Score (CPC), classroom infrastructure, and ENADE scores, may also be statistically significant in explaining student performance. Moreover, considering the educational production function, which includes variables related to students, faculty, and institutions, future research could explore factors such as study hours, marital status, family income, and faculty qualifications and professional experience to explain student performance on the exam.

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