

Dimensions of the importance of controlling in organizations: a multivariate and multicriteria study

Dimensões da importância da controladoria nas organizações: um estudo multivariado e multicritério

Dimensiones de la importancia de la controladora en las organizaciones: un estudio multivariado y multicriterio

Silvana Silva Vieira Tambosi*

Doutoranda em Ciências Contábeis e Administração
(FURB), Blumenau/SC, Brasil
profa.silvana.vieira@gmail.com
<http://orcid.org/0000-0002-4762-7957>

Nelson Hein

Doutor em Engenharia de Produção (UFSC)
Professor na Universidade Regional de Blumenau (FURB)
hein@furb.br
<https://orcid.org/0000-0002-8350-9480>

Jandir Tambosi Junior

Mestre em Administração (FURB), Blumenau/SC, Brasil
jrtambosi@gmail.com
<https://orcid.org/0000-0002-6556-8137>

Adriana Kroenke

Doutora em Métodos Numéricos e Engenharia (UFPR)
Professora na Universidade Regional de Blumenau (FURB)
akroenke@furb.br
<https://orcid.org/0000-0001-6625-3017>

Primary contact address for correspondence*

Rua Antônio da Veiga, nº 140, Bairro Itoupava Seca, CEP: 89030-903, Blumenau/SC, Brasil

Abstract

This study's objective was to analyze the variability in the undergraduate students' answers to the importance of organizations' control function. This article adopted a quantitative approach based on the theoretical perspectives of Borinelli's (2006) studies, the descriptive analysis, the multivariate exploratory factorial analysis, and the multicriterial technique through the information entropy technique. The main results indicated that the 234 students of the Accounting Sciences program presented variability in the perception of the controlling companies' activities. Construct 3, "Controlling Activities and Functions Related to the Management Process" (present in Factors 4 and 5), showed the construct that offered the highest variation. In the respondents' perception, the Controller functions are more related to the operational processes than the organizations' strategic ones.

Keywords: Controlling; Controller; Functions of Controlling

Resumo

O objetivo que norteou este estudo foi analisar a variabilidade nas respostas dos graduandos do curso de Ciências Contábeis sobre a importância da função da controladoria nas organizações. Para isto, adotou-se uma abordagem quantitativa com base nas perspectivas teóricas dos estudos de Borinelli (2006), a análise descritiva, a técnica multivariada análise fatorial exploratória, e a multicriterial por meio da técnica de entropia da informação. Os principais resultados indicaram que os 234 discentes do curso de Ciências Contábeis apresentaram variabilidade na percepção das atividades da controladoria nas empresas. A dimensão que apresentou maior variação foi a Dimensão 3 "Atividades e Funções da Controladoria Relativas ao Processo de Gestão" (presente nos Fatores 4 e 5). Na percepção dos respondentes as funções da controladoria estão mais relacionadas aos processos operacionais do que aos estratégicos nas organizações.

Palavras chave: Controladoria; *Controller*; Funções da Controladoria

Resumen

El objetivo que orientó este estudio fue analizar la variabilidad en las respuestas de los graduandos del curso de Ciencias Contables sobre la importancia de la función de la controladora en las organizaciones. Para ello, se adoptó un abordaje cuantitativo basado en las perspectivas teóricas de los estudios de Borinelli (2006), el

análisis descriptivo, la técnica multivariada análisis factorial exploratorio, y la multicriterial por medio de la técnica de entropía de la información. Los principales resultados indicaron que los 234 discentes del curso de Ciencias Contables presentaron variabilidad en la percepción de las actividades de la controladora en las empresas. La dimensión que presentó mayor variación fue la Dimensión 3 "Actividades y Funciones de la Contraloría Relativa al Proceso de Gestión" (presente en los Factores 4 y 5). En la percepción de los respondedores las funciones del controlador están más relacionados a los procesos operativos que a los estratégicos en las organizaciones.

Palabras clave: Controladoria; Controlador; Funciones de la Controladoria

1 Introduction

Controllershship in organizations initially had its functions strictly related to the accounting subject, such as "accounting, managerial-strategic, costs, tax, information management, protection and internal control of assets and risks" (Borinelli, 2006, p. 135).

However, currently, Controllershship has reached a larger space in planning organizational actions (Frezatti et al., 2009; Lunkes et al., 2011; Lourensi & Beuren, 2011). Under the perspective of changes in companies' economic and social scenarios, Controllershship has been assuming strategic roles in organizations. The need for the support that managers demand economic-financial information, analysis, and simulation of future scenarios be monitored and analyzed by the controllers (Frezatti et al., 2009; Lunkes et al., 2011).

Such changes regarding the role of Controllershship in organizations are still in the process of discussion by theorists and professionals in the subject; that is, there is variability in understanding the role of Controllershship in companies. However, specialists working on this topic (Lourensi & Beuren, 2011). This conceptual dissonance among researchers favors the inconsistency of the literature on the subject. As some scholars conceptualize Controllershship as a managerial support position, others classify it as an accounting activity for external purposes (Borinelli, 2006; Lunkes, Gasparetto & Schnorrenberger, 2010).

Thus, understanding the role of Controllershship in the company is important. In particular, by College that prepares future professionals (undergraduates) to work in this sector. Some studies already point out the Colleges' concern in training their academics because of the new demands arising from the changes caused by a worldwide conjuncture, stimulating reflections on their role in training their academics to take up jobs that require a new approach. In addition, they seek to understand the impacts of student training on academic and professional performance (Siegel & Kulesza, 1996a; Siegel & Kulesza, 1996b; Siegel, Kulesza & Sorensen, 1997; Frezatti & Kassai, 2003; Rodrigues & Amaral, 2006; Peleias et al., 2011; Mondini, Tambosi & Lavarda, 2015).

From this perspective, the following research question is raised: What is the variability in the understanding, among undergraduate students of the accounting science course, about the importance of the controllership function in organizations? It seeks to recover if there is any complication in the perception of students in this subject. Experts recognize that some practices in the controllership topic vary between organizations due to their characteristics, such as size, industry, region, etc. However, despite being a topic composed of interdisciplinary knowledge, the controllership function's fundamental principles must remain since their subject of expertise and performance are regulated (Borinelli, 2006).

2 Literature Review

The subject of management's control developed in 1960 and was based on accounting. This subject is a traditional approach to Controllershship, which is a way in which managers assert that resources are acquired and used efficiently and effectively in achieving the organization's objectives (Anthony, 1965; Lowe & Puxty, 1989; Merchant, 1989; Otley, 1990; Otley, 1994).

However, there were some changes in the role of Controllershship in organizations due to a new economic environment that instigated changes in the structure of organizations. Factors such as uncertainty, size of the organization, concentration, and alliances, declining production (Odey & Berry, 1980). These factors brought some implications for management control: the existence of management control, the orientation of business processes, balanced scorecard, competition, flexibility (Lowe, 1971; Kaplan & Norton, 2005).

In a more contemporary view, Controllershship is a topic in organizations whose diligence is the effectiveness of internal and external management processes, ensuring that all involved (stakeholders) have access to the information necessary for the development of their work. Controllershship is a subject where knowledge disseminated, and demands are adjusted to be implemented in companies' accounting and management information systems (Frezatti et al., 2009).

As for the specific functions attributed to Controllershship, Borinelli (2006, p. 135) lists the "accounting, managerial-strategic, costs, tax, information management, protection, and internal control, of assets and risks." However, Lunkes et al. (2011) point out that, in addition to information management, Controllershship must have active participation in organizational decisions through the strategic planning process.

Corroborating Frezatti et al. (2009), the authors Lourensi and Beuren (2011, p. 02) reiterate in their study that "Controllershship increasingly assumes a preponderant role in the administrative context of

organizations. By providing information to support the management process, it intends to contribute to the continuity of these organizations." However, they consider its scope for considering Controllershship as a "relatively new subject of knowledge. There are still doubts about its conceptualization, its role in the management process, and the procedures adopted by it as an administrative body." (Lourensi & Beuren, 2011, p. 02).

The research by Lourensi and Beuren (2011) sought to analyze Controllershship's insertion, under the perspectives proposed by Borinelli (2006): conceptual, procedural, and organizational. The first (conceptual) aspect addressed the study of the subject of knowledge named Controllershship. The second aspect (procedure) was investigated the principles related to its operation. That is, it deals with the functions inherent to Controllershship in organizations. The third (organizational) element dealt with how the roles and practices of Controllershship are understood and treated in institutions.

Thus, Controllershship functions are not limited to producing and disclosing accounting information, which, although important, is not sufficient to cover the macro-management process. Such observation is relevant since Controllershship is the sector of the organization responsible for preparing economic-financial data, necessary so that controllers can support managers in decision making, helping to achieve organizational objectives (Frezatti et al., 2009). Regarding the Controller functions in organizations, in the 40s, studies pointed to a discrepancy in the activities of controllers in companies' sectors, which demonstrated an absence of clarity in this function (FISKE, 1940). The consensual lack of such a report remained imprecise until the 1980s, as highlighted by author Yoshitake (1982) in his study.

According to Frezatti et al. (2009, p. 29), "For years, the controller was only responsible for carrying out formal accounting, preparing accounting and financial records and custody of the company's assets." The Controller role was limited to elaborating technical information, considering only its financial performance (Otle, 1999). Gradually, this professional's functions were expanded, beginning to carry out more in-depth analyzes and explanations. It is also important to note that the Controller role's expansion occurred after creating the Controllers Institute of America, which is an organization committed to improving the sector and controllershship professionals (Macdonald, 1940).

In addition to the support of organizations such as the Controllers Institute of America, changes in the Controller role are also attributed to companies' new needs in the most current context. The author points out, in particular, the emergence of the capital market, which made accounting work so that it could support managers in monitoring their performance, thus ensuring the interests of shareholders and investors (Frezatti et al., 2009).

Regarding the role of the Controller in organizations and the training of these professionals, the authors Siegel and Kulesza (1996a); Siegel and Kulesza (1996b); Siegel et al. (1997); Frezatti and Kassai (2003); Rodrigues and Amaral, (2006); Peleias (2011); Oro, Beuren and Carpes (2013); Mondini et al. (2015) point out that despite the interdisciplinarity in the performance of these professionals, there must be a reflection on the academic curricula in the teaching of Controllershship in HEIs. The purpose is to train graduates to take up positions in the labor market that require a new approach, from organizations that need supporters to plan and make strategic decisions.

Also, the teaching of Controllershship in accounting science courses as required by the Federal Council of Education, based on Resolution CNE / CES December 10 December 16, 2004. Also, aware of the conceptual consolidation of Controllershship, scholars in the sector have sought to define and identify the competencies and skills inherent in the activity (Borinelli, 2006; Rodrigues & Amaral, 2006; Beuren & Grande, 2008; Carvalho Júnior & Rocha, 2009; Lunkes et al., 2010; Lunkes et al., 2012; Paiva & Facci, 2014; Araújo, Callado & Cavalcanti, 2014; Gomes, Souza & Lunkes, 2014; Schnorrenberger, Castro & Lunkes, 2015).

2.1 Previous Studies on The Research Model Used

Previous researches that used the same model adopted in this study showed disagreements in the controllershship theme's conceptual partner. Borinelli (2006) organized and systematically presented the definitions, identifying the abstract debate between theorists in the subject, mainly about Controllershship's functions and this professional's role in companies.

As already mentioned in the previous chapter, the author theoretically classifies Controllershship under three aspects: conceptual, procedural, and organizational. For Borinelli (2006, p.105), controllershship "is a set of knowledge that constitutes theoretical and conceptual bases of operational, economic, financial and patrimonial orders related to the control of the organizational management process." Subsequently, it lists the functions it contemplates to the Controllershship, and finally, it considers the ordering of these functions in the different topics of the organization.

Other research, such as the authors Beuren and Grande (2008), Lourensi and Beuren (2011), Mondini et al. (2015), support the model proposed by Borinelli (2006) in the conceptual, procedural, and organizational spheres. Beuren and Grande (2008) adopted the Borinelli (2006) model to identify approaches related to national publications' theme. The results revealed that Controllershship is little examined as a subject of knowledge in national publications. The focus of national literature on Controllershship activities is focused on addressing the processes that manage information.

Then, Lourensi and Beuren (2011) again used the conceptual perspectives suggested by Borinelli (2006) to analyze the inclusion of Controllershhip in the doctoral theses defended in the FEA/USP program between 1997 and 2006. They found that, concerning conceptual, procedural, and organizational issues, the controllership theme is of little significance in the discussions and analyzes of these works.

The study by Mondini et al. (2015), investigated the understanding of students who had already taken the controllership course, with students who worked in the controllership sector of a company, about the role of the Controller in organizations, also measured from Borinelli's model (2006). The results indicated that there is an agreement, among those surveyed, that the functions of Controllershhip are related to operational activities, but also strategic topics. This data suggests that Controllershhip has been increasingly perceived as a function with a more strategic focus on companies.

3 Research Methods and Techniques

This section describes the methodological framework of the research and the procedures for collecting and analyzing the data.

3.1 Methodological Framework

To answer this study's objective was to analyze the variability in undergraduate accounting students' responses on the importance of the controllership function in organizations. We adopted the quantitative method in the approach and data treatment through multivariate and multicriteria statistical techniques.

The quantitative method aims to measure the data collected by collecting information, analyzing numerical data, and applying statistical tests. The validity of quantitative studies occurs through statistical indicators (Hair, 2009; Collis & Hussey, 2013). Regarding the research technique, the descriptive one was adopted, which, according to Hair (2009), is usually used to examine the characteristics of research events or activities in a structured way.

The multicriteria method is a systematic analysis that seeks to identify, characterize, and classify the main constituent factors by comparing the variables proposed in the criteria set. The aim is to offer possible alternatives to the group's preferences involved in the decision-making process (Matzenauer, 2003; Gomes, Autran, Araya & Carignano, 2004; Stewart, 2011; Almeida, 2013).

3.2 Data Collection and Analysis Procedures

Regarding the questionnaire used for data collection, we used the constructs and indicators proposed by Borinelli (2006). The questionnaire was composed of 48 questions divided into four constructs (Chart 1), with the Likert measurement scale type of 7 points, with variances between 1, for disagree and 7, totally agree.

In addition to the proposals adopted by Borinelli's model, the questionnaire contained questions about the respondents' profile, such as Gender; Age; College; Course semester; if you have already taken or are taking the Controllershhip if the academic works in the controllership sector. The structured questionnaire was made available in two versions: via Google Forms and in print, applied at a College, answered by undergraduate students in the Accounting Sciences program. Data collection took place in the first academic semester of 2015, and this research obtained 234 respondents.

Then, we tabulated the data in a Microsoft Excel® spreadsheet. We grouped the questions according to the proposed constructs (Figure 1). We imported the Microsoft Excel® spreadsheet database into SPSS® Statistical Software version 22. The first analysis performed was an exploratory factorial. It is a multivariate statistical technique that analyzes the pattern of correlations existing between variables, and, through these patterns, it seeks to group its variables into factors. The objective is to verify the existence of structures that cannot be observed directly (Corrar, Paulo & Dias Filho, 2007).

The second analysis performed was the information entropy multicriteria. This method is used in this research to determine the evaluated indicators (Zeleny, 1982; Zou, Yi & Sun, 2006). The term entropy originally came from thermodynamics, and over time it has been used in other subjects of knowledge, such as the social sciences (Rocha et al., 2011).

For the entropy calculation, a reference point was necessary: an anchor value about the value at which the information's entropy is calculated. In this research, the assigned value was 7 (Totally Agree). In this way, the entropy value will recommend how much information is present in each question of the research questionnaire used (Zeleny, 1982; Rocha et al., 2011).

INDICATORS	Construct 1: Primary Attribution of Controllership	
	D1Q1	Maintain the accounting records of the company's transactions.
	D1Q2	Perform equity control (fixed assets).
	D1Q3	Consolidate the financial statements.
	D1Q4	Prepare the financial statements.
	D1Q5	Disclose accounting information.
	D1Q6	Perform an analysis of the company's financial statements.
	D1Q7	Calculate, check, record, and collect taxes.
	D1Q8	Guide the units regarding taxes.
	D1Q9	Prepare Tax Planning.
	D1Q10	Perform internal control.
	D1Q11	Perform an internal audit.
	D1Q12	Hiring and managing insurance.
	D1Q13	Apply and raise financial resources (financial and treasury management).
	D1Q14	Perform financial controls.
	D1Q15	Realize and control cash flow.
	D1Q16	Control payments to be made (accounts payable).
	D1Q17	Conduct feasibility analysis studies for projects.
	D1Q18	Perform Management Accounting.
	D1Q19	Manage the IT infrastructure of information systems.
	D1Q20	Manage information systems (except IT).
	D1Q21	Act as a user of information systems.
	Construct 2: Primary Assignment of the Controller of an Organization	
	D2Q22	To relate to shareholders, investors, and owners.
	D2Q23	Relate to government.
	D2Q24	Relate to tax authorities.
	D2Q25	Relate to external audits.
	D2Q26	To relate to class entities.
	D2Q27	To relate to financial institutions.
	D2Q28	Relationship with suppliers.
	D2Q29	Relationship with customers
	Construct 3: Controllership Activities and Functions Relating to the Management Process	
	D3Q30	Participate in the Strategic Planning analysis process.
	D3Q31	Participate in the Strategic Planning process.
	D3Q32	Participate in the Strategic Planning control process.
	D3Q33	Participate in the tactical planning process.
	D3Q34	Participate in the Tactical Planning control process.
	D3Q35	Participate in the Budget preparation process.
	D3Q36	Participate in the Budget control process.
	D3Q37	Participate in the external environmental analysis process.
	D3Q38	Participate in the internal environmental analysis process.
	D3Q39	Participate in the performance evaluation process.
	D3Q40	Participate in the management cost measurement process.
	D3Q41	Participate in the managerial transfer pricing process
	D3Q42	Participate in the sales price definition process.
	D3Q43	Participate in the Tax Planning process.
	Construct 4: Controllership Posture in Organizations	
	D4Q44	Advisory.
	D4Q45	Consulting.
	D4Q46	Controllership.
	D4Q47	Audit.
	D4Q48	An internal spokesperson for senior management.

Figure 1: Constructs and variables of Controllership in companies

Source: Adapted from Borinelli (2006); Mondini et al. (2015).

To analyze the collected data, we sought to verify the variability in the answers regarding the agreement and disagreement of the attributes (questions). For this, the following mathematical model was applied mathematically, according to Zeleny (1982) and Rocha et al. (2011):

$d_i = (d_i^1, d_i^2, \dots, d_i^m)$ the normalized values, in which: $d_i^k = \frac{x_i^k}{x_i^*}$, characterizing the set D, in the form of the i-th attribute. It is defined $D_i = \sum_{k=1}^m d_i^k$; $i = 1, 2, \dots, n$. The entropy measure of the intensity contrast for the i-th attribute is calculated by:

$e(d_i) = -\alpha = \sum_{k=1}^m \frac{d_i^k}{D_i} \ln \left(\frac{d_i^k}{D_i} \right)$, where $\alpha = \frac{1}{e_{max}} > 0$ e $e_{max} = \ln(m)$. Recalling that $0 \leq d_i^k \leq 1$ e $d_i^k \geq 0$. In the event of all the k, i and d are identical for given i, in such a case $\frac{d_i^k}{D_i} = \frac{1}{n}$ e $e(d_i)$ admits maximum value, that is, $e_{max} = \ln(m)$. Retaining $\alpha = \frac{1}{e_{max}}$ is designated $0 \leq e(d_i) \leq 1$ for all d_i 's. Such normalization is essential for comparison purposes. The total entropy of D is determined by: $E = \sum_{i=1}^n e(d_i)$. Because of the weight λ_i^* be oppositely concatenated to $e(d_i)$ is used $1 - e(d_i)$ as opposed to $e(d_i)$ and normalizes to ensure that $0 \leq \lambda_i^* \leq 1$ e $\sum_{i=1}^n \lambda_i^* = 1$. Thus, we have: $\lambda_i^* = \frac{1}{n-E} [1 - e(d_i)] = \frac{[1 - e(d_i)]}{n-E}$.

4 Analysis and Results

In this chapter, the results of the research will be presented and discussed. In the first part, the students' profile is shown, then the data on the constructs of the model by Borinelli (2006) are presented. These constructs were analyzed using the multivariate statistical technique, exploratory factor analysis. An analysis of the variability of the information was performed based on the multicriteria analysis using the information entropy technique to answer the objective of this study: to analyze the variability in undergraduate accounting students' responses on the importance of Controllershship in organizations.

Initially, a descriptive analysis was carried out to determine the respondents' profile, covering gender, age, whether the respondent has already taken or is taking the controllership course, and if he/she works professionally in the controllership sector (Table 1).

Table 1:
Profile of Respondents

Gender (%)		AGE (years in %)				
Female	Male	18-28	29-39	40-50	51-61	Over 61
58%	42%	85%	12,5%	1,2%	10%	3%
About the Controllershship Course (%)				Works in the Controllershship Sector (%)		
It is studying this semester.			30,6%	Yes	10,4%	
It has already been attended.			57,9%			
It studied the subject of Controllershship in another course of the program.			11,5%	No	89,6%	

Source: research data

It can be seen in Table 1 that the majority (58%) of the students are female and aged between 18 and 28 years (85%). As for the Controllershship course, 57.9% answered that they had already studied, 30.6% are studying in the semester in which the research was applied, and 11.5% have not yet studied; however, they have studied the subject in another course offered by the program. It is also interesting to note that most students (89.6%) do not work in the controllership sector, so the students' perception of the role of Controllershship in organizations is based on the program teachers' teachings. It is understood that these, in turn, are specialists and researchers in the subject of Controllershship, who must have an understanding of the subject under the three perspectives of Borinelli (2006), which are: conceptual, procedural, and organizational.

Next in Tables 2, 3, 4, and 5 are presented, the exploratory factor analysis's statistical tests.

Table 2:
KMO and Bartlett test

Measure Kaiser-Meyer-Olkin sampling adequacy.		0,831
Chi-square approx.		6283,492
Bartlett's sphericity test	df	1081
	Sig.	0,000

Source: research data

According to Table 2, it can be seen that the KMO presented an adequate level of confidence since the value was 0.831. Bartlett's test confirms that the set of items can represent the construct (Fávero et al., 2009).

Table 3:
Communalities

Questions	Initial	Extraction	Questions	Initial	Extraction
D1Q1	1,000	0,760	D2Q26	1,000	0,613
D1Q2	1,000	0,727	D2Q27	1,000	0,727
D1Q3	1,000	0,837	D2Q28	1,000	0,673
D1Q4	1,000	0,853	D2Q29	1,000	0,638
D1Q5	1,000	0,726	D3Q31	1,000	0,770
D1Q7	1,000	0,723	D3Q32	1,000	0,757
D1Q8	1,000	0,755	D3Q33	1,000	0,760
D1Q9	1,000	0,744	D3Q34	1,000	0,789
D1Q13	1,000	0,734	D3Q35	1,000	0,801
D1Q14	1,000	0,736	D3Q36	1,000	0,798
D1Q15	1,000	0,788	D3Q37	1,000	0,783
D1Q16	1,000	0,715	D3Q38	1,000	0,841
D1Q18	1,000	0,639	D3Q40	1,000	0,736
D1Q19	1,000	0,613	D3Q41	1,000	0,672

Questions	Initial	Extraction	Questions	Initial	Extraction
D1Q20	1,000	0,660	D3Q42	1,000	0,671
D1Q21	1,000	0,697	D3Q43	1,000	0,725
D2Q23	1,000	0,687	D4Q44	1,000	0,735
D2Q24	1,000	0,740	D4Q45	1,000	0,662
D2Q25	1,000	0,671	D4Q47	1,000	0,767

Source: research data

As shown in Table 3, the extraction method was used to analyze the main component. In other words, the strength of the question is verified by the other items. Thus, the questions obtained the least relation with the others should be excluded from the group (<0.35) (HAIR, 2009). This study excluded the items: D1Q6, D1Q10, D1Q11, D1Q12, D1Q17, D2Q22, D3Q39, D4Q46, D4Q48.

Table 4:
Total Variance Explained

Components	Initial eigenvalues			Extraction sums of squared loads			Rotating sums of squared loads		
	Total	% variance	% cumulative	Total	% variance	% cumulative	Total	% variance	% cumulative
1	9,838	25,890	25,890	9,838	25,890	25,890	4,723	12,430	12,430
2	4,434	11,667	37,557	4,434	11,667	37,557	3,894	10,249	22,679
3	2,504	6,589	44,146	2,504	6,589	44,146	3,510	9,237	31,916
4	1,980	5,211	49,358	1,980	5,211	49,358	2,901	7,634	39,550
5	1,801	4,739	54,097	1,801	4,739	54,097	2,619	6,891	46,441

Extraction method: analysis of the main component.

Source: research data

Table 4 shows that the first five components already correspond to 54.09% of the variance. It was decided not to consider the other elements, as the values started to become small about the number of variables.

Table 5:
Rotating a component matrix

Questions	Component									
	1	2	3	4	5	6	7	8	9	10
D1Q4	,853									
D1Q1	,831									
D1Q3	,830									
D1Q7	,735									
D1Q5	,719									
D1Q2	,695									
D1Q15		,806								
D1Q14		,793								
D1Q16		,729								
D1Q13		,717								
D2Q29		,566	,454							
D2Q24			,763							
D2Q23			,729							
D2Q27		,405	,696							
D2Q25			,692							
D2Q26			,687							
D2Q28		,524	,542							
D3Q32				,855						
D3Q31				,838						
D3Q33				,586		,376				
D3Q34				,559		,478				
D1Q18				,518	,370					
D3Q40					,787					
D3Q41					,786					
D3Q42					,665					
D3Q43					,488				,470	
D3Q36						,803				
D3Q35						,796				
D3Q37							,878			

Questions	Component									
	1	2	3	4	5	6	7	8	9	10
D3Q38							,863			
D4Q45								,826		
D4Q44								,777		
D1Q9							,406		,598	
D4Q47								,410	,531	
D1Q8	,456								,516	
D1Q20										,696
D1Q19		,491								,598
D1Q21				,384						,593

Extraction method: Principal component analysis.

Rotation method: Varimax with Kaiser normalization.

a. Converged rotation in 20 iterations.

Source: research data

As shown in Table 5, of the 48 items surveyed, 38 items can be grouped into ten constructs. However, in this study, we chose to consider the factors that obtained at least four questions grouped in the same explanation factor: the first five factors, as explained in Table 4. Each component or item's entropy was then calculated, scaled by the exploratory factorial (Table 6).

Table 6:
Information Entropy

Variables		Entropy e(d _i)	Weight
Factor 1	D1Q4	0,974542854	0,189734873
	D1Q1	0,97984178	0,150241401
	D1Q3	0,980890691	0,142423757
	D1Q7	0,964506099	0,264539897
	D1Q5	0,977677911	0,166368952
	D1Q2	0,988368461	0,08669112
Factor 2	D1Q15	-0,982208193	0,166956934
	D1Q14	-0,984135998	0,167119309
	D1Q16	-0,969856224	0,165916555
	D1Q13	-0,971953344	0,166093191
	D2Q29	-0,981031704	0,166857841
	D2Q28	-0,983386377	0,16705617
Factor 3	D2Q24	0,981994429	0,23310405
	D2Q23	0,980166597	0,256767567
	D2Q27	0,986564013	0,012472573
	D2Q25	0,990578048	0,121978646
	D2Q26	0,98345428	0,214204511
	D3Q32	0,994873567	0,138148737
Factor 4	D3Q31	0,994094124	0,159153403
	D3Q33	0,990945217	0,244011142
	D3Q34	0,991757338	0,222125866
	D1Q18	0,991221683	0,236560852
	D3Q40	0,992017898	0,165282518
Factor 5	D3Q41	0,987821047	0,252185224
	D3Q42	0,986279227	0,284111129
	D3Q43	0,985588145	0,298421129

Source: research data

After running the mathematical model, used to calculate the entropy of the information for each question raised in the questionnaire applied for this study (Table 6), were found that the most relevant information present in Factor 1 (Construct 1) "Primordial Attribution of Controllorship," According to the respondents, were: D1Q7 "Calculate, check, book and collect taxes" (26.45%) and D1Q4 "Prepare the financial statements" (19%). The question that there was less information (8.67%) was D1Q2 "Performing the equity control (fixed assets)."

Analyzing this constructs' data, we noticed that the respondents understand as being fundamental functions of Controllorship, procedural activities. This data corroborates Borinelli's (2006) understanding of the tasks inherent to Controllorship, under the procedural aspect, that is, activities related to the functioning of Controllorship.

About the second factor, composed of questions from Constructs 1 and 2 of Borinelli's questionnaire (2006) "Primary Attribution of Controllorship" and "Primary Assignment of the Controller of an Organization," there was a homogenization of responses. The six questions present in this factor have an average of 16% of

information (variations between 16.60% and 16.71%), with no marked variability between the data. The items it was grouped in this factor deal with issues related to the realization of financial controls, cash flow control, payment control, investment and funding, relationship with customers and suppliers.

As can be seen, the functions perceived to be the Controller are still related to procedural activities. According to Otley (1999) and Frezatti et al. (2009) permanently, the functions assigned to this professional are related to the formal execution of accounting, such as the organization of financial accounting records. Thus, limiting its performance only in preparing technical information, taking into account only the organization's economic performance.

As for Factor three, composed of questions from Construct 2 "Primary Assignment of the Controller of an Organization," this deals with the relationship of the Controller with the institutions that provide essential information for the company: D2Q23 "Relates to the government" (26%); D2Q24 "Relates to the tax authorities" (23.31%); D2Q26 "Relates to class entities" (21.42%). On the other hand, the less representative question was D2Q27, "Relating to financial institutions" (1.25%). It is interesting to note that we did not attribute the issues that deal with the Controller's relationship with shareholders, investors, and owners to the Controller. This fact further reinforces the data previously discussed in Factor 2.

It is worth mentioning that the relationship with these stakeholders allows the Controller to have more strategic positioning and operational in the organization. According to Frezatti et al. (2009), in addition to organizing information, the Controller is also responsible for ensuring that stakeholders have access to relevant information to execute their work. It is also emphasized that the Controllershship is accountable for preparing economic-financial data so that the Controllers can support managers in making decisions, helping to achieve organizational objectives.

Concerning Factor four, it was found that the most relevant items present in this factor (Construct 3) "Controllershship Activities and Functions Relating to the Management Process" and (Construct 1) "Primary Controllershship Attribution," were: D3Q33 "Participate in the control process of Tactical Planning" (24.40%); D1Q18 "Performing Management Accounting" (23.66%); D3Q34 "Participate in the Budget preparation process" (22.21%). However, the questions that presented the lowest percentage of information were: D3Q31 "Participating in the control of Strategic Planning" (15.91%) and D3Q32 "Participating in the process of preparing Tactical Planning" (13.81%).

It is inferred that these data reflect the students' perception from their teachers' perspective and the available bibliography regarding the role of Controllershship and Controller in organizations. The activities of Controllershship are more related to operational activities than strategic ones. This data corroborates the research by Beuren and Grande (2008), Lourensi and Beuren (2011), in their studies, identified that Controllershship was little explored as a subject of knowledge in national publications and that national literature deals with the functions of Controllershship as processes that manage information.

Finally, in Factor five, the questions that concentrated more information on this factor (Construct 3) "Controllershship Activities and Functions Relating to the Management Process" were: D3Q43 "Participating in the Tax Planning process" (29.84%); D3Q42% "Participate in the sales price definition process" (28.41%); D3Q41 "Participate in the managerial transfer pricing process" (25.22%). However, the question presented less information was the D3Q40 "Participate in the management cost measurement process" (16.53%).

Analyzing the most general information in Factor five, the respondents considered it essential for the Controllershship to participate in tax planning processes, the definition of the sale price, and managerial transfer. Contrary to what was presented in Factor four, these data envision an understanding that the Controller's role is not limited to a set of execution tasks, but its importance in participating in more strategic activities of the organization.

5 Conclusion

It is understood that Controllershship in organizations initially had its functions strictly related to the accounting sector. On the other hand, in a more contemporary view, Controllers Controllershships are summing an increasingly strategic and supportive role in making organizational decisions (Frezatti et al., 2009; Lourensi & Beuren, 2011; Mondini et al., 2015).

This study aimed to analyze the variability in undergraduate accounting students' responses to Controllershship's import. A quantitative approach was adopted based on Borinelli's reviews (2006), descriptive analysis, the multivariate technique of exploratory factor analysis, and multicriteria using the information entropy technique.

The main results indicated that the 234 students of the Accounting course had variability in the perception of controllershship activities in companies. Construct 3, "Controllershship Activities and Functions Related to the Management Process" (present in Factors 4 and 5), presented the construct that raised the most significant variation. The items belonging to this construct showed an agreement among the students that the controllershship activity is linked to operational functions. Still, there is also a need for the Controller to participate in strategic demands.

Another important aspect was that the students who have already worked in companies in the controllershship sector did not cause variability in students who did not have professional experience. It is inferred

that the professors of the accounting science course's view and knowledge affect the perception of their students regarding the role of Controller. Despite the pointed variability, it is still predominant that the sector is perceived as more operational than strategic.

It was possible to verify that there is still a lack of maturity in the academy regarding Controllershship's role in Controllershships of controllers in organizations. It is noticed that students even understand operational activities as a function of Controllershship. Controllershship reflects a relatively new subject, which still needs studies, as highlighted by Lourensi and Beuren (2011). However, the discussion regarding the discrepancy in understanding the functions attributed to Controllershship Controllershships has been going on for more than 70 years (Fiske, 1940).

Thus, it is suggested for future studies that, Borinelli's perspectives be used under the analysis that enables the adequacy of the curricula of the bachelor's degree courses in accounting sciences, in the same way, to ascertain the perception of teachers about the attributions of Controllershship organizations.

References

- Almeida, A. T. (2013). *Processo de decisão nas organizações: construindo modelos de decisão multicritério*. São Paulo: Atlas.
- Anthony, R. N. (1965). *Planning and Control Systems: A Framework for Analysis [by]*. Division of Research, Graduate School of Business Administration, Harvard University.
- Araújo, J. G. R., Callado, A. L. C.; & Cavalcanti, B. S. B. (2014) Habilidades e Competências do Controller: um Estudo com Alunos de Cursos de Pós-graduação em Controladoria. *Revista Catarinense da Ciência Contábil*, 13(38), 52-64. <https://doi.org/10.16930/2237-7662/rccc.v13n38p52-64>
- Beuren, I. M. & Grande, J. F. (2008). Abordagens da Controladoria em Livros Publicados no Brasil. *RIC - Revista de Informação Contábil*, 2(1).
- Berry, A. J. (1994) Spanning traditional boundaries: organization and control of embedded operations. *Leadership & Organization Development Journal*, 15(7), 4-10. <https://doi.org/10.1108/01437739410066478>
- Carvalho Júnior, C. V. O. and Rocha, J. S. (2009) Controladoria no Brasil: um estudo a partir da perspectiva dos pesquisadores brasileiros. *Revista de Administração e Contabilidade da FAT*, 1(1), 4-19.
- Collis, J. & Hussey, R. (2013). *Business research: A practical guide for undergraduate and postgraduate students*. Palgrave Macmillan.
- Corrar, L. J., Paulo, E. & Dias Filho, J. M. (2007). *Análise multivariada: para os cursos de administração, ciências contábeis e economia*. São Paulo: Atlas, p. 280-323.
- Fávero, L. P., Belfiore, P., Silva, F. D., & Chan, B. L. (2009). *Análise de dados: modelagem multivariada para tomada de decisões*.
- Fiske, W. P. (1940). Training for the controllership. *The Accounting Review*, 15(2), 232-238.
- Frezatti, F. & Kassai, S.(2003). Estudo do impacto de um curso MBA em controladoria na evolução de seus egressos. *Revista Contabilidade & Finanças*, 14(SPE), 54-65. <https://doi.org/10.1590/S1519-70772003000400003>
- Frezatti, F., Rocha, W., Nascimento, A. & Junqueira, E. (2009). *Controle Gerencial: uma abordagem da contabilidade gerencial, no contexto econômico, comportamental e sociológico*. São Paulo: Atlas.
- Gomes, C. V., Souza, P. & Lunkes, J. R. (2014). O perfil do profissional da controladoria solicitado por empresas brasileiras. *GCG-Globalización, Competitividad y Gobernabilidad*, 8(1), 970.
- Gomes, L. F., Autran, M., Araya, M. C. G. & Carignano, C (2004). *Tomada de decisões em cenários complexos: introdução aos métodos discretos do apoio multicritério a decisão*. São Paulo: Thomson.
- Hair, J. F. et al. (2009). *Análise multivariada de dados*. Bookman Editora.
- Kaplan, R. S. & N, David P. (2005). *The balanced scorecard: measures that drive performance*. Harvard Business School Publishing.

- Lourensi, A. & Beuren, I. M. (2011). Inserção da Controladoria em teses da FEA/USP: uma análise nas perspectivas dos aspectos conceitual, procedimental e organizacional. *Contabilidade Vista & Revista*, 22(1)
- Lowe, E. A (1971). On the idea of a management control system: integrating accounting and management control. *Journal of Management Studies*, 8(1), 1-12. <https://doi.org/10.1111/j.1467-6486.1971.tb00833.x>
- Lowe, T. & Puxty, T. (1989). The problems of a paradigm: a critique of the prevailing orthodoxy in management control. In: *Critical perspectives in management control*. Palgrave Macmillan UK, p. 9-26. https://doi.org/10.1007/978-1-349-07658-1_2
- Lunkes, R. J., Gasparetto, V. & Schnorrenberger, D. (2010). Um estudo sobre as funções da controladoria. *Revista de Contabilidade e Organizações*, 4(10), 106-126. <https://doi.org/10.11606/rco.v4i10.34779>
- Lunkes, R. J., et al. (2011). Funções da controladoria: Um estudo nas 100 maiores empresas do Estado de Santa Catarina. *Análise Psicológica [online]*, 29(2), 345-361. <https://doi.org/10.14417/ap.57>
- Lunkes, R. J. et al. (2012). Controladoria: um estudo bibliométrico no Congresso Brasileiro de Contabilidade de 2000, 2004 e 2008. *Revista Brasileira de Contabilidade*, 175, 24-37.
- Matzenauer, H.B. (2003). *Avaliação da sustentabilidade ambiental de municípios Paraibanos: Uma aplicação utilizando o método PROMETHEE II*. Tese de Doutorado Apresentada ao Programa de Pós-Graduação em Recursos Hídricos e Saneamento Ambiental da Universidade Federal do Rio Grande do Sul.
- Macdonald, J. H. (1940). *Controllership: its functions and technique: prepared for the Controllers' Institute of America*. Controllers Institute of America.
- Mondini, V. E. D., Tambosi, S. S. V. & Lavarda, C. E. F. (2015). Atribuições da Controladoria e Função do Controller nas Organizações: Percepção dos Graduandos de Ciências Contábeis. *Anais do XXXIX ENANPAD*, 2015, Belo Horizonte. XXXIX ENANPAD.
- Oro, I. M., Beuren, I. M., & Carpes, A. M. (2013). Competências e habilidades exigidas do controller e a proposição para sua formação acadêmica. *Contabilidade Vista & Revista*, 24(1), 15-36.
- Otley, D. (1990). Issues in accountability and control: some observations from a study of colliery accountability in the British Coal Corporation. *Management Accounting Research*, 1(2), 101-123. [https://doi.org/10.1016/S1044-5005\(90\)70048-0](https://doi.org/10.1016/S1044-5005(90)70048-0)
- Otley, D. (1994). Management control in contemporary organizations: towards a wider framework. *Management Accounting Research*, 5(3), 289-299. <https://doi.org/10.1006/mare.1994.1018>
- Otley, D. (1999). Performance management: a framework for management control systems research. *Management Accounting Research*, 10(4), 363-382. <https://doi.org/10.1006/mare.1999.0115>
- Paiva, J. C. L. S. & Facci, N. (2014). O ensino da disciplina de controladoria: um estudo comparativo nas instituições de ensino superior do estado do Paraná. *Revista Unifamma*, 12(2).
- Peleias, I. R. et al. (2011). Interdisciplinaridade no ensino superior: análise da percepção de professores de controladoria em cursos de ciências contábeis na cidade de São Paulo. *Avaliação: Revista da Avaliação da Educação Superior*, 16(3). <https://doi.org/10.1590/S1414-40772011000300002>
- Rocha, I. et al. (2011). A presença da entropia da informação no controle orçamentário em ambiente inovador. *RAI Revista de Administração e Inovação*, 8(2), 82-105. <https://doi.org/10.5773/rai.v8i2.566>
- Rodrigues, M. S. & Amaral, M. S. (2006). O ensino da disciplina de controladoria nos programas de pós-graduação em nível de especialização em ciências contábeis e o profissional controller atuante no mercado de trabalho. *Enfoque*, 25(3). <https://doi.org/10.4025/enfoque.v25i3.3456>
- Schnorrenberger, D.; Castro, G. K. & Lunkes, R. J. (2015). Perspectivas profissionais do controller no Brasil e Espanha. *Anais do Congresso Brasileiro de Custos-ABC*.
- Siegel, G. & Kulesza, C. S. (1996a) The coming changes in management accounting education. *Strategic*

Finance, 77(7), 43.

Siegel, G. & Kulesza, C. S. (1996b). The practice analysis of management accounting. *Strategic Finance*, 77(10), 20.

Siegel, G., Kulesza, C. S. & Sorensen, J. E. (1997). Are you ready for the new accounting? *Journal of Accountancy*, 184(2), 42.

Stewart, T. J. (2011). Multicriteria Decision Analysis. In: Lovric M. (eds) *International Encyclopedia of Statistical Science*. Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-642-04898-2_384

Yoshitake, M. (1982). *Funções do controller: conceitos e aplicações de controle gerencial*. Dissertação (Mestrado em Ciências Contábeis) –Programa de Pós-graduação em Ciências Contábeis, Departamento de Contabilidade e Atuária, Faculdade de Economia, Administração e Contabilidade da Universidade de São Paulo, São Paulo.

Zeleny, M. (1982). *Multiple Criteria Decision Making*. McGraw-Hill, New York.

Zou, Z., Yi, Y.; Sun, J (2006). Entropy method for determination of weight of evaluating indicators in fuzzy synthetic evaluation for water quality assessment. *Journal of Environmental Sciences*, 18(5), 1020-1023. [https://doi.org/10.1016/S1001-0742\(06\)60032-6](https://doi.org/10.1016/S1001-0742(06)60032-6)

NOTES

ACKNOWLEDGMENT

The authors would like to thank to Coordination for the Improvement of Higher Education Personnel (CAPES)

AUTHORITY CONTRIBUTION

Conception and elaboration of the manuscript: S.S.V. Tambosi, J.Tambosi Junior, N. Hein, A. Kroenke

Data collection: S.S.V. Tambosi

Data analysis: S.S.V. Tambosi, J.Tambosi Junior

Discussion of results: S.S.V. Tambosi

Review and approval: S.S.V. Tambosi

SEARCH DATA SET

The entire data set that supports the results of this study was published in the article itself.

FINANCING

This work was carried out with the support of the Coordination for the Improvement of Higher Education Personnel - Brazil (CAPES) - Financing Code 001.

CONSENT TO USE IMAGE

Not applicable.

APPROVAL OF THE RESEARCH ETHICS COMMITTEE

Not applicable.

CONFLICT OF INTERESTS

Not applicable.

USE LICENSE

Copyrights for articles published in this journal are the author's, with first publication rights for the journal. Due to appearing in this Public Access Magazine, the articles are free to use, with their own attributions, in educational, professional and public management applications. The magazine adopted the [Creative Commons Attribution 4.0 International license - CC BY NC ND](https://creativecommons.org/licenses/by-nc-nd/4.0/). This license allows accessing, downloading (downloading), copying, printing, sharing, reusing and distributing the articles provided that the source is acknowledged, attributing the due authorship credits. In such cases, no permission is required from the authors or editors. Authors are authorized to assume additional contracts separately, for non-exclusive distribution of the version of the work published in this journal (eg, publishing in institutional repository or a book chapter).

PUBLISHER

Federal University of Santa Catarina. Accounting Sciences Course and Postgraduate Program in Accounting.



Publication on the [UFSC Journal Portal](#). The ideas expressed in this article are the responsibility of their authors, and do not necessarily represent the opinion of the editors or the university.

EDITORS

Carlos Eduardo Facin Lavarda and Suliani Rover

HISTORIC

Received on: 09/07/2018 – Peer reviewed on: 14/04/2020 – Reformulated on: 11/05/2020 – Recommended for publication on: 15/10/2020 – Published on: 15/01/2021