

Research article

Determinants of non-financial information accountability in universities: The case of Colombia

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Abstract

This work aims to analyze the determinants of accountability in public and private Colombian universities. The variables access and availability of information were measured through an index and related to variables of the university core missions. Based on legitimacy and stakeholder theory, which proposes a multi-agent approach to the use of information, and given the growing inclusion of Sustainable Development Goals as benchmarks to define the strategies developed by universities, it has been established that university information should look beyond financial aspects and consider environmental and social elements. A panel data methodology was used and 141 observations were made during the 2016-2018 period. The results show a positive relationship among university's core missions, welfare, and the disclosure of non-financial information. Nevertheless, reporting this information is still an emerging issue, that is, accountability processes need to be strengthened with solid and homogeneous structures to meet the needs of the university community.

Keywords: accountability; university reports; sustainability report; university social responsibility; sustainable development goal.

Determinantes de la rendición de cuentas de información no financiera en las universidades: el caso de Colombia

Resumen

Este artículo tiene como objetivo analizar los determinantes de la rendición de cuentas en las universidades públicas y privadas colombianas. Las variables de acceso y disponibilidad de información fueron medidas a través de un índice y relacionadas con variables de las misiones centrales de la universidad. Basados en la teoría de la legitimidad y de las partes interesadas, que propone un enfoque multiagente para el uso de la información, y dada la creciente inclusión de los Objetivo de Desarrollo Sostenibles como puntos de referencia para desarrollar las estrategias propuestas por las universidades, se ha establecido que la información universitaria debe ir más allá de los aspectos financieros y considerar los elementos ambientales y sociales. Se utilizó una metodología de datos de panel y se realizaron 141 observaciones durante el período 2016-2018. Los resultados muestran una relación positiva entre las misiones centrales de la universidad, el bienestar y la divulgación de información no financiera; sin embargo, la comunicación de esta información sigue siendo un tema emergente, por lo que los procesos de rendición de cuentas deben fortalecerse con estructuras sólidas y homogéneas que permitan satisfacer las necesidades de la comunidad universitaria.

Palabras clave: rendición de cuentas; informes universitarios; informe de sostenibilidad; responsabilidad social universitaria; objetivo de desarrollo sostenible.

Determinantes da rendição de contas de informação não financeira nas universidades: o caso da Colômbia

Resumo

Este artigo tem como objetivo analisar os determinantes de rendição de contas nas universidades públicas e privadas colombianas. As variáveis de acesso e disponibilidade de informação foram mensuradas por meio de um índice e relacionadas a variáveis das missões centrais da universidade. Com base na teoria da legitimidade e dos *stakeholders*, que propõe uma abordagem multiagente para o uso da informação, e dada a crescente inclusão dos Objetivos de Desenvolvimento Sustentável como pontos de referência para desenvolver as estratégias propostas pelas universidades, estabeleceu-se que a informação universitária deve ir além dos aspectos financeiros e considerar elementos ambientais e sociais. Foi utilizada uma metodologia de dados em painel e foram realizadas 141 observações durante o período 2016-2018. Os resultados mostram uma relação positiva entre as missões centrais da universidade e o bem-estar e a divulgação de informações não financeiras; No entanto, a comunicação desta informação continua a ser uma questão emergente, pelo que os processos de responsabilização devem ser reforçados com estruturas sólidas e homogêneas que permitam satisfazer as necessidades da comunidade universitária.

Palavras-chave: prestação de contas; relatórios universitários; relatório de sustentabilidade; responsabilidade social universitária; objetivo de desenvolvimento sustentável.

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1. Introduction

Accountability is becoming increasingly important in organizations due to stakeholders' demand, not only the reporting financial information, but also for the disclosure of non-financial information that creates an atmosphere of transparency to validate the actions of universities (Bice & Coates, 2016; Hernández-Salido et al., 2018).

Within the accountability framework, a greater effort must be made by universities when disclosing information given the social relevance and implications of their actions for society. They must do so by disclosing their performance information to users under the triple bottom line structure in terms of social, environmental, and economic issues (Abello-Romero et al., 2019) that benefit their stakeholders and develop action plans tailored to their needs (Agyeman, 2020).

Colombian universities must report to the university community. However, only the institutions' financial aspects are regulated, so non-financial elements remain voluntary and not homogenized. As a result, diverse guidelines are considered to meet accountability requirements concerning the social, environmental, and economic spheres (De la Poza et al., 2021; Huerta-Riveros & Gaete-Feres, 2017).

The goal of this work is to relate the disclosure of non-financial information in universities and the activities made within the university's core missions that have an impact on university social responsibility.

By prioritizing the Sustainable Development Goals (SDG), these become part of the university structure, and universities can devise projects with greater inclusion and impact. In turn, they generate information that should be disclosed through diverse communication strategies. In addition, they are a strategic pillar within university planning because they consider issues that affect all the university community (De la Poza et al., 2021; Prieto-Jiménez et al., 2021).

A total of 47 universities –31 public and 16 private– were considered in this work to assess the determinants that influence their accountability processes. The analysis focused on the period between 2016 and 2018, given the effective date of the SDGs and the universities' information-reporting, yielding a total of 141 observations using a micro panel (Wooldridge, 2010).

The findings of this research evince the need to strengthen accountability processes and how the university's core missions play an important role in building an atmosphere of transparency. Moreover, USR programs along with the SDGs provide a broader picture when disclosing non-financial information (Eccel Pontelli et al., 2023).

A literature review on stakeholder theory, reports as an instrument for information disclosure, and university accountability are presented below. Then, the methodology is explained, followed by the results. Lastly, the conclusions and implications of the work are discussed.

2. Theoretical framework

This section is divided into two parts: the first one focuses on stakeholder theory and reports as an instrument for information disclosure, while the second part focuses on accountability in Colombian universities.

2.1. Stakeholder theory and reports as an instrument for information disclosure

Accountability encompassing both financial and non-financial information is becoming increasingly important (Hernández-Salido et al., 2018). This need for information is no longer useful to shareholders exclusively; from the perspective of stakeholder theory (Freeman, 1984), information must possess a multi-agent character. In consequence, all stakeholders need such information to enable the organization to hold greater legitimacy among stakeholders and hence be more sustainable (Laplume et al., 2008).

This multi-agent approach has a direct relationship with the entities' interaction with stakeholders. As such, it is embedded in a process of creating shared value, where the dynamics entails contributing to and creating it. In addition, each participant has a role in the entity's environment, then all types of information should be disclosed to ensure all of them are involved (Moggi, 2019).

There is no homogenized structure for accountability processes. Some means are, however, more accepted and used than others as they are normative in nature, even though they are only concerned with purely financial aspects, leaving aside non-financial information (Bekessy et al., 2007). There are also various communication strategies to comply with accountability demands. Nevertheless, report rendering has become one of the best information disclosure strategies in organizations.

Interest in accountability has also given greater strength to institutions' result-reporting processes (Abello-Romero et al., 2019). The involvement of legitimacy theory is clear from this point onwards as trust is built between agents and the institution in a turbulent political, social, and cultural context in which accountability plays a key role as the main means to create transparency (Bice & Coates, 2016) and a more effective public balance of state action (Lai et al., 2018).

The globalization phenomenon has made the role of accountability more relevant, causing institutions to restructure their way of disclosing information by integrating USR and the SDGs (Cebrián et al., 2020). It is worth noting these revelations facilitate the generation or increase of value creation (Chica Salgado & Soto Durán, 2019) by promoting the development of strategies and action plans, which seek to impact diverse users who partake in the institutions' core activities (Larrán Jorge et al., 2019; Prieto-Jiménez et al., 2021).

2.2. Accountability in universities

In Colombia, reporting financial information is mandatory for universities. However, the evolution of accountability through institutional statements and reports has led to the inclusion of qualitative information focused on the social and environmental welfare of all stakeholders.

The inclusion of non-financial information in universities' account rendering is based on the incorporation of their core missions i.e., teaching, research, and extension, evidencing their impacts. This accountability also includes university welfare, a cross-cutting element where both the social and environmental spheres become important and all the university community participates (Ceulemans et al., 2015). In this way, the university seeks to move from a socially responsible institution to one that is fully integrated into society by disclosing the results of its different core missions and other aspects that are key to management.

Authors including Moneva and Martin (2012), Larrán Jorge et al. (2015) and Católico-Segura (2012) analyze the extent of accountability from a university social responsibility approach based on information indexes that examine how universities meet stakeholder demands, thus rendering accountability more effective. The results show the scarce growth of a culture of accountability responsive to sustainability criteria. Similarly, Amey et al. (2020) suggest that accountability is reflected in general aspects such as web page quality and the age of institutions as the main explanatory variables for the degree of disclosure attained, ahead of other academic and financial characteristics.

The significance of teaching quality and university accreditation for accountability processes has a positive effect on non-financial information disclosures as teachers become better qualified. As these qualifications are obtained, visibility and impact on undergraduate and graduate programs will, in turn, be greater and their accreditation and recognition will be higher; permanent compliance with guidelines and methodologies accepted for disclosure processes is also fulfilled, which has a positive impact on comprehensive accountability (Católico-Segura, 2012; Larrán-Jorge & Andrades-Peña, 2015; Larrán Jorge et al., 2019; Moneva & Martín, 2012). In this vein, the following hypotheses are proposed:

- H1=** Universities with the highest number of full-time teachers make a better disclosure of non-financial information.
- H2=** Universities with the highest number of accredited programs make a better disclosure of non-financial information.

Regarding the research core mission, authors such as Moneva and Martin (2012), Alonso-Almeida et al. (2015) and González et al. (2015) argue that, to a greater extent,

universities' information disclosure is directed toward academic and research aspects. This type of disclosures, although important, fall short of all the potential information that may be revealed, with social impact aspects being relegated in favor of information about academic and research results; therefore, qualitative information relating to those spheres is incomplete (Ceulemans et al., 2015). Consequently, the third hypothesis is put forward:

- H3=** Universities with better research results make a better disclosure of non-financial information.

Sánchez-Canales et al. (2017) claim that universities are increasingly seeking to strengthen their social responsibility and University Welfare programs. Thus, accountability through reports should contain measurement indicators or strategies (Moggi, 2019) providing reliability and comparability. They should focus on sustainable development (Cebrián et al., 2020) so that they are useful to all users, aligning and prioritizing the SDGs in the institution (De la Poza et al., 2021; Prieto-Jiménez et al., 2021) for devising a comprehensive university disclosure framework (Cortés León & Gutiérrez Fernández, 2019; Umar, 2020).

In this way, and in connection with the extension core mission, the following hypotheses are proposed (Heaton et al., 2022):

- H4=** Universities that have USR programs make a better disclosure of non-financial information.
- H5=** Universities that prioritize the SDGs make a better disclosure of non-financial information.

It must be noted that sustainability reports are increasingly gaining more relevance in the creation of atmospheres of transparency and impact (Minguet & Solís, 2019; Ramísio et al., 2019). USR programs are key in sustainability report creation processes, highlighting the prioritization of the SDGs towards a culture of sustainability and an impact on the community (El-Jardali et al., 2018; Mawonde & Togo, 2019).

The integration of the SDGs with USR policies is crucial to create non-financial information disclosure guides because they generate information of impact for the community; hence, their relationship with accountability is positive (De la Poza et al., 2021). Universities are not only focusing on financial information, they are increasingly strengthening channels, mechanisms, and actions that enable a better relationship with their stakeholders (Nicolò et al., 2021).

Sustainability reports are the means to comply with accountability processes as an effective communication element, so there is a positive relationship with the disclosure of non-financial information (Ceulemans et al., 2015). The following hypothesis is thus proposed:

H6= Universities that disclose sustainability reports or a social balance make a better disclosure of non-financial information.

3. Methodology

This section presents the sample, variables and model estimation used to evaluate the level of information disclosure by Colombian universities from institutional reports.

3.1. Sample

Data from the National Higher Education Information System - SNIES (Ministerio de Educación Nacional, 2020) and the 2019 Higher Education Ranking (Times Higher Education, 2019) were used as a basis for this study. In Colombia, the Higher Education System includes both public and private higher education institutions.

Based on the 2019 Higher Education ranking, 47 universities were chosen, including 31 public and 16 private ones. Public universities depend on the national government, so the entire sample of the public sector was used. There are only 16 private universities, because in 2019 they submitted their accountability reports to the THE ranking, which values sustainability aspects with a strong emphasis on the SDGs. These private universities currently prioritize the SDGs.

The periods 2016, 2017, and 2018 were analyzed because the SDGs began to be applied by the institutions in these years and became the guidelines governing action and strategic plans as well to achieve them. Furthermore, due to the backlog in institutional databases, the necessary information from universities during these periods is available. A total of 141 observations were collected, their breakdown by year is shown in Table 1.

Table 1. Sample composition per year.

Year	Amount	Relative Frequency
2016	47	0.33
2017	47	0.33
2018	47	0.33
Total	141	1.00

Source: own elaboration

The public universities that make up the sample are distributed in the 32 departments of Colombia due to their nature, while the private institutions are concentrated in Bogotá, followed by Medellín, Cali, and Barranquilla.

3.2. Variables

The dependent variable was determined, and the independent and control variables were established as follows.

3.2.1. Dependent variable

A non-financial information disclosure index was developed with a set of categories addressed and analyzed from the studies of Católico-Segura (2012) and Larrán Jorge et al (2015, 2019). They establish the extent to which universities disclose and implement sustainability practices and examine the main factors that could explain their implementation of sustainability practices.

The established categories are shown in Table 2. Except for teaching qualifications, the university's years of existence, and the percentage of undergraduate and postgraduate students and teachers, all the parameters evaluated were measured on a scale from 0 to 1, with 1 representing access to these parameters and 0 representing non-disclosure.

The highest teaching qualification was assessed in a range of 1 to 5. The university's age is assigned a score from 1 to 5. This range was determined based on the sampled universities. Finally, the percentage of undergraduate students, post graduate students, and teachers was relativized (Moneva Abadía & Martín Vallespín, 2012).

Table 3 shows how this dependent variable was measured; it was transformed into more homogeneous data by multiplying by one hundred and taking the natural logarithm.

3.2.2. Independent variables

The independent variables consider aspects of the universities' core missions as well as their social dimension.

Moneva and Martin (2012) argue that the number of full-time teachers has an impact on the quality of the information disclosed by universities, because their dedication to the university can generate a greater impact on the achievement of objectives and the development of strategies that lead to its development, thus fulfilling its social purpose (Alonso-Almeida et al., 2015).

In order to consider the impact on the teaching mission, the number of full-time teachers as well as the number of professors with a doctoral and postdoctoral degree were considered as in Larrán Jorge et al. (2019), where, through a GRI study for universities, it is determined that teachers' qualifications is a key element when developing transparency mechanisms, therefore generating comprehensive disclosure processes (Bice & Coates, 2016; Moura-Leite et al, 2020).

Moreover, it is necessary to consider the university's accredited programs; this variable provides greater visibility to the institution, thus it is conducive to having greater supervision and surveillance, not only by the entities in charge, but also by the community in general. It also implies that the programs have met quality and research criteria, which are important and significant aspects when generating social impact (Católico-Segura, 2012).

Table 2. Categories evaluated per index (Dependent variable).

Category	Parameters evaluated
Information about the web page content	Access to the Development Plan and/or Annual Operating Plan
	Access to governance code and code of ethics
	News service on their academic activities
	Inclusion of search engines on the web page to facilitate access to information
	Administrative staff contact directory
	Name, position, and brief overview of the management staff
	Access to technological and electronic tools
	Dissemination of guidelines for third-party contracts
	<i>Saber Pro</i> test results
	Access to information in several languages
	Access to sites linked with academic regulation or management, quality assessment or university rankings
	A specific section encompassing the disclosed financial and budgetary information
	A specific section for accountability
Information related to University Reports	Postal address and contact email address of the university
	Access to the Rector's management report
	Access to the audit report
	ISO quality certification
	Accounting policies applied for the preparation of accounting information
Access to Financial Information	Number of prizes awarded by the academic community
	Years of existence of the university
	Access to budgets and budget execution for the last year
	Access to budgets and budget execution dating back to two or more years
Mission Indicators – Teaching	Access to the accounting statements of the last year
	Access to the accounting statements dating back to two or more years
	Information on the undergraduate and postgraduate programs offered
	Percentage of undergraduate students
Mission Indicators – Research	Percentage of postgraduate students
	Percentage of teachers
	Description of teachers' qualification
	Mention of the research groups
Mission Indicators – Outreach	Mention of the research projects
	Information on patents
	Information on journals
Mission Indicators – Outreach	Service activities aimed at community welfare
	Consulting activities
	Outreach courses

Source: own elaboration based on [Larrán Jorge et al. \(2015\)](#), [Católico-Segura \(2012\)](#) and [Larrán Jorge et al. \(2019\)](#).

Table 3. Dependent variable.

Variable	Abbreviation	Measurement	Source
Disclosure index	Disln	Natural logarithm of the ratio between the Yi aspects disclosed by each University and the maximum value representing the "n" aspects evaluated, multiplied by 100.	(Católico-Segura, 2012 ; Larrán Jorge et al., 2015 , Larrán Jorge et al., 2019)

Source: own elaboration

According to [Moneva and Martin \(2012\)](#), [Católico-Segura \(2012\)](#), [González et al. \(2015\)](#) and [Ceulemans et al. \(2015\)](#), research is one of the most effective ways of generating changes in all university stakeholders, both internally and externally. It is through research that universities can fulfil their social purpose, in addition to fostering the creation of new knowledge, strengthening companies, and contributing to the country's development through publications in scientific journals, research groups, and patents. Scientific advances in universities

are publicized, and this should be disclosed as part of university management and performance reports (Larrán Jorge et al., 2015).

In relation to the extension core mission, authors such as Puertas and Marti (2019) and Larrán and Andrades (2017) highlight the role of social responsibility programs as the means by which all internal agents can participate in the decision making of these institutions. Thus, universities tend to create formalized and structured USR programs that enable the improvement of processes and results.

Because universities are dynamizers of society and powerful generators of innovation and technology (Galdos et al, 2020), the activities developed within them should be aimed at the current trends of sustainable development (Smaniotto et al., 2020). Thus, the SDGs should serve as a guide and should be in line with all of their action and development plans, in addition to including the teaching, research, and extension core missions (Cortés León & Gutiérrez Fernández, 2019).

Nowadays, the SDGs represent one of the main topics of disclosure in universities, in compliance with the guidelines of the National Government after signing the 2030 agenda and for reputational reasons, to access awards such as the GRI and attain a better position in different rankings due to compliance with the SDGs (Cavallo et al., 2020; Larrán Jorge et al., 2019; Mawonde & Togo, 2019).

It must be noted that the presentation of sustainability reports is one instrument of accountability (Nekhili et al., 2017); therefore, this presentation seeks to satisfy to a greater extent the expectations of stakeholders, as well as to enable the development of strategies to improve university management.

Table 4 details the variables and their respective measurement and source.

3.2.3. Control variables

These variables were obtained from the financial information reported by the universities through their Financial Statements. It is reasonable to expect that size measured by assets and the level of indebtedness will influence social performance (Zuniga-Jara et al., 2018) and decision-making of university stakeholders, and have an impact on social responsibility actions.

The university level of disclosure is positively affected by a greater size of assets, thus allowing the institution to have a higher level of operation and growth expectations. Similarly, when combined with effective debt management, it allows for the expansion of services and even of the offer of extension programs.

Table 5 shows the control variables. The assets logarithm was applied to the size variable due to the heterogeneity of the data (Balasubramanian et al., 2010).

Table 4. Interest variables.

Variable	Abbreviation	Measurement	Fuente
Full-time teachers	Teach	Natural logarithm of the number of full-time teachers	(Católico-Segura, 2012; Moneva Abadía & Martín Vallespín, 2012)
Teachers with doctoral and postdoctoral degrees	Doc	Natural logarithm of the number of teachers with a doctoral or postdoctoral degree.	(Larrán Jorge et al., 2019; Moneva Abadía & Martín Vallespín, 2012)
Institutionally accredited programs	Accr	Natural logarithm of the number of accredited programs disclosed by the university in its reports	(Católico-Segura, 2012)
Indexed journals	IndexJ	Natural logarithm of the university's indexed journals	(Larrán Jorge et al., 2015)
Accredited research groups	AccreG	Natural logarithm of the number of research groups accredited by Colciencias	(Católico-Segura, 2012; Larrán Jorge et al., 2019).
Patents	Pat	Natural logarithm of the number of patents reported by the university	(Católico-Segura, 2012; Moneva Abadía & Martín Vallespín, 2012)
USR program	USR	0. Does not have USR programs. 1. Has USR programs.	(Cortés León & Gutiérrez Fernández, 2019; González Gaudiano et al., 2015; Puertas & Marti, 2019)
SDG prioritization	SDG	0. There is no SDG prioritization. 1. There is SDG prioritization.	(Cortés León & Gutiérrez Fernández, 2019; De la Poza et al., 2021; El-jardali et al., 2018)
Sustainability reports	SusR	0. The university does not present sustainability reports. 1. The university presents sustainability reports.	(Alonso-Almeida et al., 2015; Larrán Jorge et al., 2015; Sánchez-Canales et al., 2017)

Source: own elaboration

Table 5. Control variables.

Variable	Abbreviation	Measurement	Source
Size	Z	Natural logarithm of assets divided by 1,000 million.	(Zuniga-Jara et al., 2018)
Indebtedness level	In	Liabilities/Assets of each university	(Moneva Abadía & Martín Vallespín, 2012; Zuniga-Jara et al., 2018)

Source: own elaboration

3.3. Model

The micro panel data provides more accurate and complete information about universities based on their behavior over time, eliminating aggregation and specification biases and providing more information to mitigate or reduce multicollinearity problems and understand unobservable characteristics of each institution (Hsiao, 2014).

Through the following model, it is proposed to establish a direct relationship between the divulgation of non-financial information and the different categories of core missions that make up university accountability processes.

The following is the model proposed for testing the hypotheses:

$$DisIn_{it} = B_0 + B_1 Teach_{it} + B_2 doc_{it} + B_3 accr_{it} + B_4 IndexJ_{it} + B_5 AccreG_{it} + B_6 Pat_{it} + B_7 USR_{it} + B_8 SDG_{it} + B_9 SusR_{it} + B_{10} Z_{it} + B_{11} In_{it} + \varepsilon_{it}$$

where *i* denotes the university; *t* indicates the year; *DisIn* is the information disclosure index; *Teach*, *Doc*, *Accr*, *IndexJ*, *AccreG*, *Pat*, *USR*, *SDG* and *SusR* are the variables reported by the universities in their management reports and the minimum that can be disclosed due to their social nature (Zuniga-Jara et al., 2018); *T* and *EN* are the control variables, with a great impact on the dependent variable, where $\varepsilon_{it} \sim iidn(0, \sigma^2)$; the coefficients $\beta_1, \beta_2, \dots, \beta_{11}$ represent the effect of each variable on *IDiv*. The data collected were used to create a panel data with several observations (Sánchez-Canales et al., 2017).

4. Results analysis

A summary of the descriptive statistics of the variables used in the developed model is provided, it is followed

by the explanatory analysis; next, the Hausman test is applied; finally, a robustness test is performed on the variables analyzed by linear regressions per year.

4.1. Descriptive analysis

Table 6 summarizes the descriptive statistics. It must be noted there are outliers at the statistical level, which were removed to ensure that the results are not biased. During the analysis period, the average number of full-time teachers in universities is 689, with an average of 176 having a doctoral or postdoctoral qualification. Furthermore, not all universities reveal the number of accredited programs in their reports; only 76% of the sample conveys this information, corresponding to an average of 17 programs in the institutions analyzed.

From the social perspective, only 64% of the universities have formalized USR programs, most of them are private institutions. Regarding SDG prioritization, only 37% of the 141 observations, corresponding to 17 universities, disclose it through sustainability reports or social balance sheets (Table 7).

Table 8 shows a direct and positive relationship between the disclosure index variable, the mission cores, and the social dimension variables distributed in 9 independent variables.

4.2. Explanatory analysis

Table 9 displays the results of the micro panel data, thus demonstrating that the variables used in the model have a good explanation, as evidenced by their R-Sq = 0.41 and a probability of 0 in their F statistic, thus implying that the employed variables explain the disclosure index dependent variable.

Table 6. Descriptive statistics.

	Variable	Obs.	Mean	Deviation	Min.	Max.
Dependent	DisIn	141	4.297486	0.142397	3.936121	4.580478
Independent	Teach	141	6.267822	0.716134	4.174387	8.037543
	Doc	141	4.547212	1.155333	1.098612	7.383989
	Accr	141	1.901357	1.265930	0.000000	4.941642
	IndexJ	141	1.064158	0.986192	0.000000	3.401197
	AccreG	141	3.848826	0.823456	1.386294	6.282267
	Pat	141	0.707176	1.028992	0.000000	4.077537
Control	Z	141	3.186765	1.754553	0.000000	6.666674
	In	141	0.175941	0.236010	0.000000	1.462886

Source: own elaboration

Table 7. Dummy variables.

	Variable	Obs.	Absolute frequency		Relative frequency	
			0	1	0	1
Independent	USR	141	50	91	0.26	0.64
	SDG	141	88	53	0.63	0.37
	SusR	141	36	105	0.26	0.74

Source: own elaboration

Table 8. Correlation matrix.

	IDiv	Prof	Doc	Acr	Rindex	Gacre	Pat	RSU	ODS	Sos	T	EN
DisIn	1											
Teach	0.4124 ***	1										
Doc	0.2678 ***	0.6504 ***	1									
Accr	0.3976 ***	0.2443 **	0.2967 ***	1								
IndexJ	0.2438 **	0.5639 ***	0.6701 ***	0.2314 **	1							
AccreG	0.3394 ***	0.6328 ***	0.7836 ***	0.5406 ***	0.5568 ***	1						
Pat	0.2599 **	0.3914 ***	0.4599 ***	0.5388 ***	0.4319 ***	0.4695 ***	1					
USR	0.1343 .	0.0692 .	0.3451 ***	0.0959 .	0.3541 ***	0.0701 .	0.1192 .	1				
SDG	0.3698 ***	0.4028 ***	0.4381 ***	0.1254 .	0.5223 ***	0.3433 ***	0.3745 ***	0.2998 ***	1			
SusR	0.5512 ***	0.1258 .	0.0822 .	0.4351 ***	0.0524	0.2528 **	0.1909 *	0.076 .	0.1522 .			
Z	0.3844 ***	0.2507 **	0.4112 ***	0.2391 **	0.2456 **	0.5206 ***	0.2515**	-0.0208	0.2046 .	0.1814 .	1	
In	0.2576 **	0.1996 *	0.1446 .	0.1068 .	0.0009	0.2302 **	0.0455	-0.0204	-0.0437	0.1808 .	0.278 ***	1

Significance codes: ***p<0.001, **p<0.01, *p<0.05, .p<0.1

Source: own elaboration

Table 9. Panel data results – Linear regression.

R-sq:	=	0.4108			
F(11,83)	=	10.16			
corr(u_i, Xb)	=	0.1607			
				Prob > F =	0.00
DisIn	Coef.	T	P> t 	[95% Conf. Interval]	
Teach	0.0136882*	1.97	0.05	-0.0001587	0.027535
Doc	0.0016712	0.23	0.82	-0.0129235	0.0162659
Accr	0.0113251	1.54	0.126	-0.0032654	0.0259156
IndexJ	0.0101974 .	1.75	0.085	-0.0014235	0.0218183
AccreG	0.0192223	1.04	0.299	-0.0173974	0.055842
Pat	0.0030759	0.76	0.45	-0.0049871	0.0111389
USR	0.0104515	0.5	0.617	-0.0310085	0.0519115
SDG	0.0277727*	2.51	0.014	0.0057592	0.0497861
SusR	0.080155***	5.63	0.00	0.0518454	0.1084647
Z	0.0038961 .	1.88	0.063	-0.0002151	0.0080073
In	0.0112957	0.9	0.37	-0.0136145	0.0362059
_cons	4.004271***	47.45	0.00	3.836417	4.172125
F test that all u_i=0:		F(46, 83) =	55.8	Prob > F =	0.0000

Significance codes: ***p<0.001, **p<0.01, *p<0.05, .p<0.1

Source: own elaboration

The number of teachers with a direct link to the university is regarded as a dynamizer of academic and research aspects within universities (Larrán Jorge & Andrades Peña, 2017). The results corroborate H1, since the number of teachers influences the accountability processes of the universities. In the selected institutions, a positive relationship between the number of teachers

and the disclosure index was observed ($\beta = 0.0136$, $p < 0.05$). According to Católico-Segura (2012) and Valderrama Pereira & Uribe Mora (2014), the teaching core mission is where universities reveal more information oriented to aspects of their academic programs and everything involving the participation of stakeholders in this core mission (Larrán Jorge et al., 2019).

The non-significance of the doctoral and post-doctoral programs variable may be explained by the fact that only 23% of the analyzed universities have professors with post-doctoral degrees. However, all the universities have a teaching staff with doctoral degrees besides incorporating more teachers with a higher degree of qualification.

Although H2 presents accredited programs as an important factor within the information disclosure processes, it is rejected according to the results ($\beta = 0.0113$, $p > 0.1$). This is due to the concentration of academic aspects in the accreditation models of Latin American institutions.

With regard to research, H3 is accepted, as specifically evidenced by the variable of indexed journals ($\beta = 0.0102$, $p < 0.1$). It supports the arguments of [Moneva and Martín \(2012\)](#) and [Umar \(2020\)](#), who present research as an important axis with impact on the university community. According to the findings, the disclosure of research-related information should be more focused on indexed journals, because better accountability processes can be achieved through publications, and it has a direct relationship with non-financial disclosures in universities ([Sánchez-Canales et al., 2017](#)).

Although works such as [Católico-Segura \(2012\)](#) and [Larrán \(2017\)](#) affirm that USR programs help to raise the level of university disclosure, H4 is rejected ($\beta = 0.0104$, $p > 0.1$). The non-significance in Colombia may be due to the scarcity of formally structured programs (only 31 out of 47 universities) and their low maturity, so they still do not have a significant impact on university extension.

Regarding the prioritization of the SDGs, the results obtained ($\beta = 0.0278$, $p < 0.05$) indicate a positive relationship with the level of disclosure and corroborate H5. This is because the institutions have a direct responsibility with sustainable development ([Australia/Pacific, 2017](#); [Galdos et al., 2020](#)), which leads to a greater commitment with all their stakeholders ([Mawonde & Togo, 2019](#)).

Finally, because there is a direct relationship between sustainability reporting and disclosure indices ($\beta = 0.0805$, $p < 0.001$), H6 is accepted. Sustainability reports are one of the communication tools used to disclose non-financial information ([Huerta-Riveros & Gaete-Feres, 2017](#)). Therefore, using these strategies allows accountability processes in universities to have a greater impact and, as a result, generate clearer and more useful disclosure processes for all information users ([Ramísio et al., 2019](#)).

The model was validated by applying the Hausman test ([Table 10](#)), relating the conditions proposed for the variables with the inclusion of fixed and random effects. The result confirms the incidence of the variables since they cover the different core missions of the university and help to explain its accountability.

4.3. Robustness analysis

A simple linear regression by year was applied to each university to evaluate the effects of the independent variables on the level of information disclosure. [Table 11](#)

summarizes the main findings for 2016, 2017, and 2018. To conduct the test, 47 observations per year were used.

Table 10. Hausman test.

	Coefficients			
	(b) fe	(B) re	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
Teach	0.0167361	0.0136882	0.0030479	0.0012324
Doc	-0.0001326	0.0016712	-0.0018038	.
Accr	0.013678	0.0113251	0.0023529	.
IndexJ	0.0091194	0.0101974	-0.001078	.
AccreG	0.013048	0.0192223	-0.0061743	.
Pat	0.0018849	0.0030759	-0.001191	0.000677
USR	0.0093386	0.0104515	-0.0011128	.
SDG	0.0282853	0.0277727	0.0005126	.
SusR	0.0866759	0.080155	0.0065209	.
Z	0.0044628	0.0038961	0.0065209	0.0004858
In	0.0139274	0.0112957	0.0026317	0.0019075

b = consistent under H_0 and H_a ; obtained from xtreg
 B = inconsistent under H_a , efficient under H_0 ; obtained from xtreg
 Test: H_0 : difference in coefficients not systematic
 $\chi^2(11) = (b-B)'[(V_b-V_B)^{-1}](b-B) = 31.88$ Prob> $\chi^2 = 0.0008$
 Source: own elaboration

Table 11. Robustness test results.

Variables	Disclosure index - Year 2016		Disclosure index - Year 2017		Disclosure index - Year 2018	
	Coef.	P> t	Coef.	P> t	Coef.	P> t
Teach	0.0304	0.300	0.099 **	0.005	0.1156 **	0.003
Doc	0.0496 .	0.082	0.0016	0.949	-0.0591	0.175
Accr	0.0347 *	0.043	0.0383.	0.058	0.0405 .	0.057
IndexJ	-0.0032	0.894	0.0111	0.668	-0.0228	0.422
AccreG	-0.1119 **	0.008	-0.1042 *	0.025	-0.0126	0.801
Pat	-0.0125	0.515	-0.0189	0.416	-0.0168	0.408
USR	0.0319	0.372	0.0143	0.713	0.0226	0.631
SDG	0.0889 *	0.032	0.0617	0.128	0.1113 *	0.018
SusR	0.1435 ***	0.001	0.1136 **	0.010	0.0855	0.069
Z	0.0394 ***	0.001	0.0328 **	0.002	0.0194	0.295
In	0.0994	0.497	0.0753	0.436	0.0706	0.207
Intercept	3.9804 ***	0.000	3.7773 ***	0.000	3.6397 ***	0.000

Significance codes: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, . $p < 0.1$
 Source: own elaboration

The analysis of [Table 11](#) results, in relation to the teaching core mission, shows that the number of full-time teachers has a positive effect on the degree of information disclosed in 2017 and 2018 ($p < 0.01$), an effect like that described in the panel data with fixed effects, thus corroborating H1.

Unlike the results in [Table 9](#), institutionally accredited programs exhibit a statistically significant result all

years ($p < 0.05$ for 2016 and $p < 0.1$ for the other years). H2 is accepted and, according to [Valderrama and Uribe \(2014\)](#), this is primarily explained by the fact that universities concentrate their dissemination media on contents related to the undergraduate and postgraduate offer, seeking to increase the indices related to the number of students admitted and enrolled each academic period ([Amey et al., 2020](#)).

Regarding research results, indexed journals and patents do not show a statistically significant relationship with respect to the evaluated years. However, accredited research groups are statistically significant in 2016 and 2017 ($p < 0.01$ and $p < 0.05$, respectively), presenting a difference with respect to the micro panel data. However, despite this difference, research results continue to be strong in the model, constituting one of the main variables, and confirm H3.

USR programs results, as in the initial data panel, show little significance all years ($p > 0.1$), thus rejecting H4. According to [Católico-Segura \(2012\)](#), the university should strengthen the disclosure of information related to USR programs.

Prioritization of the SDGs continues to gain importance in accountability processes, having a positive impact in the model in 2016 and 2018 ($p < 0.05$). H5 is accepted, thus demonstrating that universities have a higher level of disclosure when they prioritize the SDGs because of the fundamental role played by these institutions in knowledge creation and dissemination ([Prieto-Jiménez et al., 2021](#); [Sonetti, Brown, & Naboni, 2019](#)), which corroborates H5.

Preparing sustainability reports has a positive effect on university disclosures, as shown in [Table 9](#), with a statistically significant result in all years of analysis ($p < 0.001$, $p < 0.01$ and $p < 0.1$, respectively). It should be noted that sustainability reporting is also the variable with the greatest impact for the panel data, thus confirming H6.

5. Final remarks

The study of accountability in universities is increasingly gaining relevance thanks to the role they play in society. Due to the scarce evidence found in the literature regarding the Colombian context, it is worth exploring the determinants of accountability in universities from a comprehensiveness and transparency framework. The disclosure of information in higher education institutions reveals heterogeneous structures governed by regulations embedded mainly in the financial sphere but overseeing social and environmental aspects, which constitutes a context worth analyzing.

This article addressed the current characteristics of the disclosure of information by universities in their institutional reports to identify the key determinants of university accountability. The results show the potential of Colombian universities to strengthen their information disclosure processes, taking the inclusion of social aspects

in their reports as a priority in both their strategies and the formalization of University Social Responsibility programs. The prioritization of the Sustainable Development Goals must be framed within the action plans of these institutions, facilitating activities of impact that should be transversal to all university activities ([Leal Filho et al., 2019](#)).

Universities play a key role in the assimilation and use of complete, clear, and comprehensive information disclosure processes –an important challenge for all the university community. Identifying the elements required for a more transparent and secure disclosure of information is necessary; this way, a culture of accountability may be created where data is generated and then turned into information. It will enable a substantial improvement to university reports and their integration with data analytics strategies.

This study provides essential elements that should be included in the disclosures made by the universities since many of them contain disaggregated information and all management results are not reported in a comprehensive manner. Stakeholders' demands will be thus fulfilled, and higher quality indices will be obtained by improving accountability in these institutions. The connection of all those who make part of the university's core missions with university welfare facilitates the development of accountability frameworks with an effective communication strategy.

Information lag is the main barrier to achieving transparency and transversality goals in this matter. Although financial requirements are complied with by rule, social and environmental aspects are pushed into the background causing information delays and therefore hindering the university community's active participation. In consequence, it is necessary to devise guidelines to mitigate this shortcoming and open the possibility of creating internal regulatory frameworks with basic yet complementary elements when disclosing information.

Creating and implementing a university management model that succeeds in integrating missional, university welfare, and financial elements –so that they are useful for all users and generate timely, homogeneous, and comprehensive information– is a challenge for these institutions. This can be achieved from a University Management Integrated Report (MIR) ([Ceballos-García et al., 2020](#)).

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Conflict of interest

The authors declare no conflict of interest.

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