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Sustainability reporting in focus: analysing Spanish transposition of the Non-Financial Reporting European Directive in the agri-food sector

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Abstract

In recent decades, the business world has undergone a paradigm shift, prioritizing social and environmental considerations over the exclusive pursuit of economic profits. Corporate social responsibility has become an essential practice, and Sustainability reports (SRs) play a crucial role in facilitating the disclosure of these practices. In the European Union (EU), Directive 2014/95/EU (Non-Financial Reporting Directive—NFRD) was enacted to compel companies to disclose information on matters addressing social, environmental, ethical, and corporate governance aspects. Spain transposed this directive through Law 11/2018, considered one of the strictest in the EU. This study aims to explore and analyse its impact on the agri-food sector. For this purpose, the SRs of 16 agri-food companies that used the Global reporting initiative standard before and after the enforcement of Law 11/2018 were evaluated applying content analysis along with repeated measures ANOVA. The results show a low level of disclosure for both periods and that Law 11/2018 does not succeed in improving the level of disclosure. This suggests that legislators should develop regulations that ensure the usefulness of the disclosed information and that companies should be more involved in the preparation of SRs.

Keywords: Non-financial information, Sustainability reports, Content analysis, ANOVA, Global reporting initiative

Introduction

In recent decades, there has been a paradigm shift in the business world, transitioning from an exclusive focus on achieving economic gain (Gray et al. 1996) to the integration of social and environmental considerations (Carroll 1999). Companies are increasingly engaging in investment and practices associated with Corporate social responsibility (CSR) to ensure that economic, social, environmental, ethical, and corporate governance impacts are integral to the management decision-making process (Baldini et al. 2018). Thus, Sustainability reports (SRs) have emerged as a crucial instrument for disclosing CSR practices, because they facilitate the monitoring, evaluation, and comparison of

sustainability company performance (Gray et al. 1996; Bovea et al. 2021; Ottenstein et al. 2021).

The European Union (EU) introduced the European Non-Financial Reporting Directive (NFRD), also known as Directive 2014/95/EU, in 2014 to measure, monitor, and manage the sustainable performance of companies (European Commission 2014). The NFRD mandates public-interest companies to prepare SRs containing social, environmental, ethical, and corporate governance information (European Commission 2014). This directive was supposed to be transposed into the regulatory framework of each member country by December 6, 2016, to come into effect on January 1, 2017, impacting the corresponding financial year (European Commission 2014). Spain transposed the NFRD into law through Royal Decree-Law 18/2017 (Gobierno de España 2017), subsequently becoming Law 11/2018 (Gobierno de España 2018). Law 11/2018 is regarded as one of the most stringent within the European Union for two primary reasons (Esteban-Arrea and Garcia-Torea 2022). Firstly, the law expands the scope of affected companies to include all businesses with more than 500 employees (this threshold is reduced to 250 from 2021 onwards) (European Commission 2014; Gobierno de España 2018). Secondly, Law 11/2018 enumerates the topics on which companies must report to adequately cover environmental, social, and labour issues, respect for human rights, and the fight against corruption and bribery mentioned in the NFRD (Gobierno de España 2018; Esteban-Arrea and Garcia-Torea 2022).

Following the implementation of NFRD, various academics have conducted studies to analyse the impact of the directive on the level of information disclosed in SRs. Some studies focus on a single country (Dumitru et al. 2017, 2019; Leopizzi et al. 2020; Carungu et al. 2020; Matuszak and Różańska 2021; Lippai-Makra et al. 2021; Korka et al. 2021), while others conduct multi-country analyses (Di Tullio et al. 2019; Cosma et al. 2021; Ottenstein et al. 2021). Of these studies, some concentrate on a specific sector (Cosma et al. 2021; Korka et al. 2021; Dumitru et al. 2019), while others perform cross-sectoral analyses (Dumitru et al. 2017; Leopizzi et al. 2020; Carungu et al. 2020; Ottenstein et al. 2021; Arif et al. 2021; Lippai-Makra et al. 2021). Studies focusing on a single sector centre on the banking (Cosma et al. 2021; Korka et al. 2021) and energy sectors (Dumitru et al. 2019). In the banking sector, Cosma et al. (2021) assert that the impact of NFRD on the SRs is significant, while Korka et al. (2021) conclude that disclosure performance worsens following NFRD's enforcement. In the energy sector, Dumitru et al. (2019) find no substantial improvement, citing the challenge of comparing SRs from different EU countries due to the ambiguity of NFRD. On the other hand, in cross-sectoral studies, some authors observe an enhancement in the disclosed information in SRs after NFRD's enforcement (Leopizzi et al. 2020; Matuszak and Różańska 2021; Ottenstein et al. 2021; Arif et al. 2021), while others believe that NFRD has not succeeded in improving SRs (Dumitru et al. 2017; Carungu et al. 2020; Lippai-Makra et al. 2021). Thus, despite extensive analysis of NFRD, there is still no consensus on whether it improves the information contained in SRs.

In this context, the objective of this study is to enhance understanding of the impact caused by the Spanish transposition of the NFRD (Law 11/2018) on the disclosure level in the SRs of companies belonging to the agri-food sector. This study focuses on the agri-food sector due to its significant contribution to the country's economy, constituting

approximately 9% of the GDP and generating around 2.7 million jobs (Maudos and Salamanca 2023). Additionally, it is recognized by the European Commission (2019) as a strategic sector for environmental conservation and food security.

To conduct this analysis, we applied content analysis to the SRs of 16 Spanish agri-food companies that followed the Global reporting initiatives (GRI) guidelines to prepare their SRs before (2014–2017) and after (2018–2021) the enactment of the Spanish transposition of the NFRD. We then used Principal component analysis (PCA) and a traditional repeated measures technique to identify variations in the level of disclosed information. This study offers valuable insights into the impact of the Spanish transposition of the NFRD on the agri-food sector. As far as the authors are aware, no prior analysis has been conducted to assess how the Spanish transposition of the NFRD affects the levels of information disclosure among agri-food companies. While this article constitutes a noteworthy contribution, it is essential to acknowledge an inherent limitation of this research—specifically, the adoption of a single information disclosure standard. This decision centred around the GRI standard, which boasts robust recognition, may impose constraints on the number of companies under evaluation. Nevertheless, this strategic choice, concentrating on a well-established standard, enhances result comparability, facilitates a more rigorous assessment, and furnishes valuable insights into the information disclosure behaviour within the context of agri-food companies. Future research initiatives could delve into the exploration of a variety of disclosure standards. This would pave the way for a more holistic understanding of non-financial reporting practices, particularly within the context of the agri-food sector. Such an approach could potentially illuminate the intricacies and nuances of these practices, thereby contributing to the development of more effective and sustainable strategies in the industry. The structure of the remainder of this paper is as follows: "Methodology" section delineates the methodological approach adopted, "Results" section elucidates the results of the study, and "Discussions" section engages in a comprehensive discussion of the principal findings. Finally, Conclusion section furnishes the conclusions drawn from the study.

Methodology

Data collection process

To collect data for this analysis, we consulted two databases. The first source was the GRI platform, which provided seven SRs, but not for both periods. From the second database, SABI[1], a financial list comprising 1728 agri-food companies was downloaded (total companies available for both periods with complete information). We then sorted this list by the number of employees and excluded all companies with fewer than 250 employees, less than 40 million in business volume, and less than 20 million euros in assets for two consecutive years between 2018 and 2021. Consequently, the sample was reduced to 255 companies. We then visited the websites of these companies and sent emails requesting their SRs before (2014–2017) and after (2018–2021) the implementation of the Spanish transposition of the NFRD. In the end, only 16 large agri-food

[1] SABI (Iberian Balance Sheet Analysis System) is an exclusive web tool developed by INFORMA in collaboration with Bureau Van Dijk, which allows users to easily and quickly access the general information and annual accounts of Spanish and Portuguese companies (https://login.bvdinfo.com/R0/SabiNeo).

Table 1 Characterization of the sample (data referring to 2021) *Source*: Own elaboration using SABI

Company	Subgroup (sector)	Operating profit (€)	Assets (€)	Number of employees
Anecoop	Food	676,120,000	1,078,053,490	399
Angel Camacho	Food	15,915,000	102,090,000	1154
Borges International Group	Drink	− 47,484,000	410,698,000	888
Calidad Pascual SAU	Food	− 32,097,000	446,169,000	1808
Cerealto Siro Foods	Food	7,250,194	290,444,478	779
Congalsa	Food	212,255	45,104,725,00	731
Corporación hijos de Rivera	Drink	1,744,689	32,203,083	2200
Dallant S.A	Food	25,331,131	230,009,723	451
Damm	Food	− 1,092,000	38,192,000	273
Ebro	Food	3,744,000	219,501,000	1975
Grupo Calvo	Food	− 245,901	68,275,079	320
Heineken España	Drink	29,903,000	2,126,712,000	7189
Hero España	Food	183,516,955	290,444,478	779
Importaco	Food-Drink	324,360,726	138,095,749	461
Nestlé Spain	Food	2,128,939	1,776,015,000	3641
Mahou	Drink	1,167,613	1,871,695,000	1283

All the companies are multinational

companies (refer to Table 1) had developed SRs before (2014–2017) and after (2018–2021) the implementation of NFRD Spanish transposition, aligning with GRI guidelines. The selection of the GRI standard was predicated on its recognition as the preeminent and globally embraced international standard for SRs (KPMG 2020). This choice is underscored by the GRI standard's notable efficacy in aligning the content of each topic mandated by Directive 2014/95/EU with the blocks of non-financial information disclosure (European Commission 2014; GRI 2017a).

Data analysis approach

Content analysis is a technique for converting qualitative information into quantitative scales (Abbott and Monsen 1979). It is widely employed in social and environmental accounting studies (Bell and Bryman 2007). This study utilizes thematic content analysis (Jones and Shoemaker 1994) as a classification scheme. The set of data coding rules established by Anguiano-Santos and Salazar-Ordóñez (2022) was applied to assess SRs adhering to GRI guidelines. In this content analysis, the hierarchical classification of GRI[2] blocks (referring to sustainability blocks) and sub-blocks (GRI 2014, 2016) was employed (see Fig. 1).

When companies reported information on a specific GRI indicator, a value of 1 was assigned; otherwise, it was recorded as 0. Following this, the scores for each indicator (I) were estimated based on the values obtained from each company. The Indicator

[2] Blocks (Sub-block): 1) Environment (Energy, Emissions, Biodiversity, Materials, Water and Effluents); 2) Social local communities (Social Local Communities); 3) Employees (Employment, Management Relations, Occupational Health and Safety, Training and Education, Diversity and Equal Opportunity); 4) Human rights (Non-discrimination, Freedom of association and collective bargaining, Child Labour, Forced or Compulsory Labour, Security Practices, Rights of Indigenous Peoples, Human Rights Assessment, Supplier Social Assessment); 5) Anti-corruption and bribery (Anti-corruption, Public Policy).

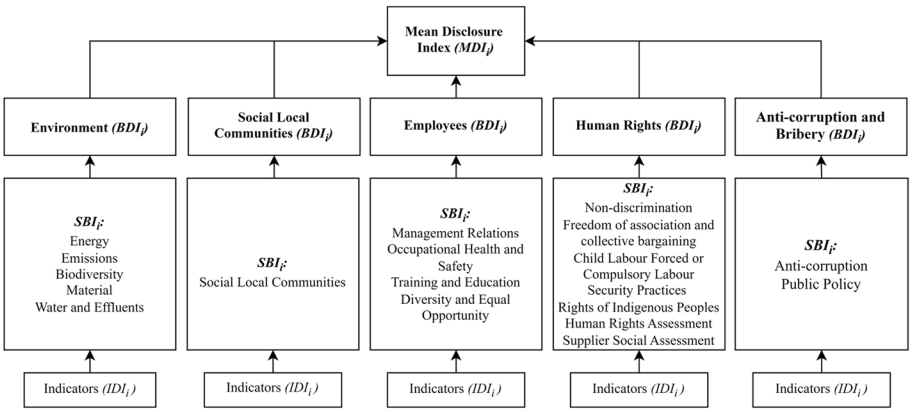

Fig. 1 Hierarchical classification of GRI *Source*: Own elaboration

disclosure index (IDI_i) was calculated by summing the scores for indicator *I* and dividing by the number of companies (*n*). Subsequently, the disclosure level for each sub-block (SBI_i) was calculated in a similar way by summing the Indicator disclosure index (IDI_i) values from the previous step and dividing by the number of indicators (*mIDI*) comprising each sub-block. Furthermore, the disclosure level for each sustainability block (BDI_i) was calculated by summing the averages of each sub-block and dividing by the number of sub-blocks (*kSBI*) that comprise the block. Finally, the Mean disclosure index (MDI_i) was calculated by summing the scores obtained for each block and dividing by the number of blocks (*lB*). All these outcomes were converted into percentages for ease of interpretation.

Below transforming the qualitative information into quantitative data by applying the above-mentioned content analysis technique, a PCA was conducted to convert financial variables into principal components that capture as much variance as possible (Hair 2009). Given the sample size limitations, only the most relevant financial indicators were included in the PCA analysis: Economic profitability, Solvency ratio, Return of assets (ROA), Return on equity (ROE), Earnings before interest taxes depreciation and amortization (EBITDA), and Liquidity ratio (Nirino et al. 2020; Partalidou et al. 2020; Conca et al. 2021; Cupertino et al. 2021). A PCA with a Promax oblique rotation was chosen to account for the interrelated nature of the financial ratios.

After conducting the PCA to reduce the dimensionality of the dataset, a two-way repeated measures ANOVA was performed as described by Weinfurt (2000). The ANOVA aimed to investigate the effects of Sustainability (representing the five different sustainability blocks from GRI) and Time (capturing the periods before and after NFRD transposition) on the sustainability disclosure level, treated as the dependent variable. Post hoc analyses were conducted for these main factors, and a contrast analysis was performed for each of the Sustainability blocks before and after NFRD transposition. To address additional sources of variance that could influence the relationship between the factors (sustainability and time) and the dependent variable (level of disclosure), several covariates were included in the ANOVA analysis. To mitigate potential confounders, individual financial variables were not directly employed. Instead, the PCA-transformed principal components were used in the ANOVA analysis.

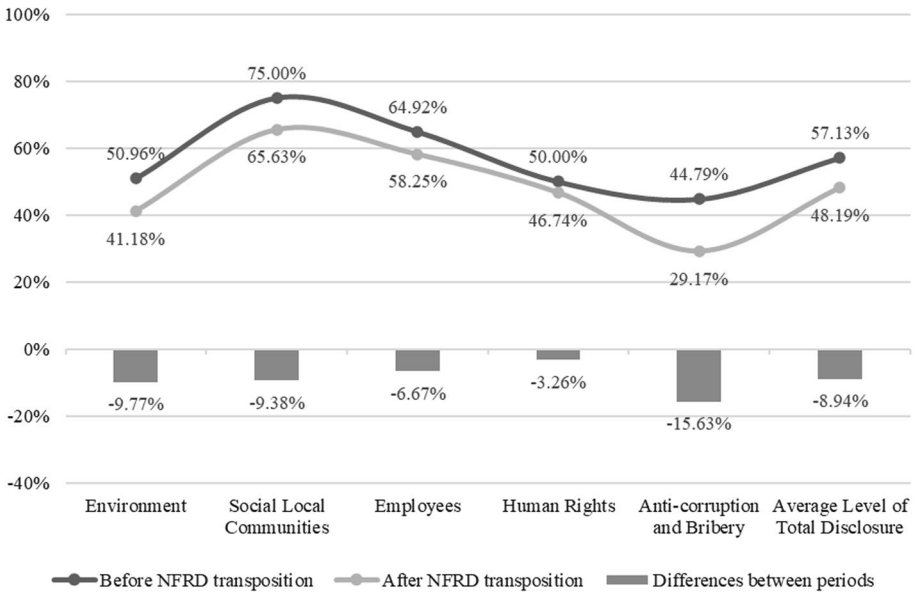

Fig. 2 Disclosure comparison before and after NFRD transposition *Source*: Own elaboration

We acknowledge the inherent limitations in statistical power and underscore the importance of considering sample size when evaluating statistical significance. In this context, the significance of the p-value, whether slightly above or below 0.05, is subordinated to assessing the practical relevance of absolute differences and effect sizes, regardless of statistical significance (Field et al. 2012). Consequently, effect size measures and absolute differences (Rodríguez-Entrena et al. 2018) are leveraged to gain insights into the disclosure behaviour of agri-food companies.

Our selection procedure leads us to reasonably assert that our sample includes the majority, if not all, of the eligible companies (affected by NFRD Spanish transposition and reporting under the GRI standard). While our study leans more towards a population-based than an inferential approach, we acknowledge the possibility of inadvertently omitting some companies. Therefore, statistical inference techniques are employed to account for any potential omissions.

Results

We present the level of disclosure of each block (*BDI*) for each period, i.e. before and after the Spanish transposition of the NFRD. The results indicate that the blocks with the highest disclosure levels before and after the Spanish transposition of the NFRD were the Social local communities and the Employees blocks. In contrast, the Anti-corruption and bribery block had the least disclosure. Furthermore, the content analysis technique revealed a clear downward trend in the level of disclosure before and after the Spanish transposition of the NFRD, with the Mean disclosure index (*MDI*) decreasing by 8.94% (see Fig. 2). This overall downward trend exhibits a remarkable degree of heterogeneity among the blocks. The Anti-corruption and bribery, Social local communities and Environment blocks showed the most significant decrease. In contrast, the Human rights and the Employees block registered the smallest decline (see Fig. 2).

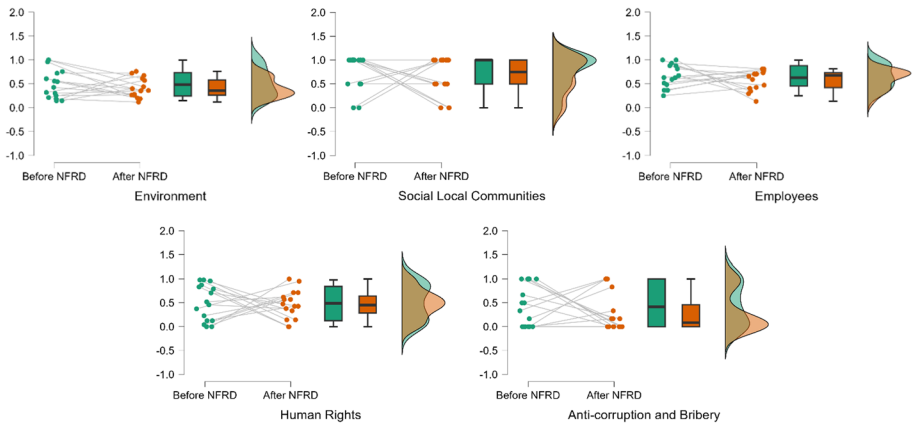

Fig. 3 Raincloud plots by block. *Source*: Own elaboration

On the other hand, Fig. 3 shows the individual behaviour of companies before and after the implementation of Spanish transposition of the NFRD by block. The Environment block exhibits a clear pattern of decreasing disclosure levels, as indicated by the reduction in the interval between whiskers. The data became concentrated in the lower part of the density plot, and the median also decreased after the implementation of the Spanish transposition of the NFRD. In the Social local communities block, it is evident how companies with a high level of disclosure changed to a low level of disclosure and vice versa. The median indicates that after the implementation of the Spanish transposition of the NFRD, the data became concentrated around lower values. Regarding Employees block, there was a decrease in the level of disclosure, but the median and the density plot show a higher concentration of data after the implementation of the Spanish transposition of the NFRD. Human rights is the most homogeneous block, with its median remaining the same after the implementation of the Spanish transposition of the NFRD. The density shows a concentration of data in the middle area, with the smallest reduction in the level of disclosure. Finally, the Anti-corruption and bribery block is the one that suffered the most significant decrease; its downward pattern is the most pronounced among the five blocks, with the median and the density plot confirming the downward movement of data. Thus, it can be observed that, on average, the distribution of data in all blocks tended to become concentrated around smaller values. Furthermore, companies with higher levels of disclosure decreased across all the blocks. Conversely, there seems to be an upward trend among companies with the lowest levels of disclosure prior to the enactment of the NFRD Spanish transposition.

Below, we present the results of the PCA analysis of financial ratios. The analysis yielded three Principal components (PCs) that explain 94.34% of the original variance. These components are:

(1) *Financial health indicators (FHI)* This component, which accounts for 42.81% of the variance, is mainly composed of a linear combination of the liquidity ratio and solvency ratio (the rotated loadings of liquidity ratio and solvency ratio on FHI were 0.98 and 0.97, respectively, while all other rotated loadings are below 0.3).

Table 2 Within-subjects effects *Source*: Own elaboration

Cases	Sphericity correction	Sum of squares	*df*	Mean square	*F*	*p*	η^2_p
Time	None	0.320	1.000	0.320	0.597	0.455	0.047
Time * FHI	None	0.410	1.000	0.410	0.766	0.399	0.060
Time * PM	None	0.450	1.000	0.450	0.841	0.377	0.065
Time * EP	None	0.225	1.000	0.225	0.420	0.529	0.034
Residuals	None	6.423	12.000	0.535			
Sustainability	None	2.237	4.000	0.559	11.179	< .001	0.482
Sustainability * FHI	None	0.132	4.000	0.033	0.659	0.624	0.052
Sustainability * PM	None	0.100	4.000	0.025	0.498	0.738	0.040
Sustainability * EP	None	0.072	4.000	0.018	0.361	0.835	0.029
Residuals	None	2.401	48.000	0.050			
Time * sustainability	None	0.066	4.000	0.017	0.253	0.907	0.021
Time * sustainability * FHI	None	0.145	4.000	0.036	0.550	0.700	0.044
Time * sustainability * PM	None	0.187	4.000	0.047	0.713	0.587	0.056
Time * sustainability * EP	None	0.257	4.000	0.064	0.978	0.429	0.075
Residuals	None	3.155	48.000	0.066			

Type III sum of squares

Sphericity corrections are not available for factors with only 2 levels, such as Time. Mauchly's *W* test for sphericity was not statistically significant for the main effect Sustainability (Mauchly's $W = 0.21$; $X^2(9) = 16.61$; $p = 0.06$) nor for the interaction effect Sustainability × Time (Mauchly's $W = 0.47$; $X^2(9) = 7.74$; $p = 0.56$)

(2) *Profitability metrics (PM)* This component, accounting for 26.58% of the variance, is mainly composed of a linear combination of Return on assets (ROA) and Return on equity (ROE) (the rotated loadings of ROA and ROE were 0.97 and 0.96, respectively, while all other rotated loadings are below 0.3).

(3) *Economic performance (EP)* This component, which explains 24.95% of the variance, is mainly composed of a linear combination of economic profitability and EBITDA (the rotated loadings of economic profitability and EBITDA were 0.89 and 0.86, respectively, while all other rotated loadings are below 0.3).

Subsequently, Table 2 displays the results of the two-way repeated measures ANOVA where it can be seen the main effect of time was not significant [$F(1,12) = 0.597$; $p = 0.455$], indicating that there was no statistically significant difference in the level of disclosure of sustainability information across the two periods of time after controlling for the effects of the covariates. On the other hand, after accounting for the effects of the covariates, the main effect of sustainability[3] was significant [$F\ (4,48) = 11.179$; $p < 0.001$], pointing to significant differences in the sustainability information disclosure level across the information blocks. Finally, the interaction term between time and sustainability was not significant [$F\ (4,48) = 0.253$; $p = 0.907$)], indicating that the effect of time on the disclosure level did not differ significantly across the blocks of sustainability information (the interaction terms did not reach explanatory power).

[3] Mauchly's test of sphericity indicates that the assumption of sphericity is met for the sustainability factor ($p < .05$) and for the interaction term between time and sustainability. This means that the variances of the differences between all combinations of related groups are similar. As a result, no corrections were applied to adjust the degrees of freedom for this factor.

Table 3 Post hoc comparisons—Time factor *Source*: Own elaboration

		Mean difference	SE	*t*	Cohen's d effect size	p_{holm}
Before	After	0.089	0.116	0.773	0.259	0.455

Results are averaged over the levels of Sustainability

On the other hand, the PCs included as covariates to act as control variables were not found to be relevant sources of explanatory power. Thus, none of the interactions between the financial covariates and the within-subjects factors was significant, indicating that the effects of Sustainability and Time on the companies' disclosure level did not differ significantly as a function of FHI, PM and EP. Likewise, the main effects (between-subjects effects) of these covariates on the companies' disclosure level were not statistically significant (FHI [F (1,12) = 0.085; p = 0.776]; PM [F (1,12) = 0.052; p = 0.824]; EP [F (1,12) = 0.509; p = 0.489]). As such, neither of these covariates turned out to significantly affect the dependent variable, meaning they did not substantially explain any variation in the companies' disclosure level.

To further enrich the analysis of the results, Table 3 presents the post hoc test for time factor. Notably, there was an average decline of 8.94 percentage points in sustainability disclosure between the periods before and after the transposition of the NFRD in Spain. Although this decrease did not reach statistical significance due to insufficient statistical power, it is essential to emphasize its practical relevance (Rodríguez-Entrena et al. 2018). Given the nature of the study and the sample size, a detailed examination of Cohen's d statistic and absolute mean differences is valuable. The effect size, according to Cohen's classification (1988), falls within the medium range. Therefore, the nearly double-digit drop recorded is of considerable relevance and warrants in-depth reflection (see "Discussions" section) in the context of the sustainability disclosure trend, despite the lack of statistical significance.

Likewise, Table 4 shows the post hoc analysis for the sustainability factor, revealing significant differences in the level of disclosure between the Environment and the Social local communities blocks (a difference of 24%) and between the Environment and the Employees (a difference of 15%). Despite the limited statistical power of the sample, these differences indicate significantly less information disclosed in the Environment block than in the Social local communities and the Employees blocks, as reflected in the relevant Cohen's d effect sizes (0.703 and 0.450, respectively). Furthermore, statistically significant differences were also identified between the Social local communities and the Human rights and between Social local communities and the Anti-corruption and bribery, with significantly more disclosure in Social local communities. These differences also display relevant effect sizes (0.637 and 0.967, respectively). Finally, statistically significant differences emerged between the employees and the Anti-corruption and bribery blocks, which can be considered relevant according to Cohen's d effect size thresholds.

As the primary objective of the analysis was to delve into the impact of the Spanish transposition of the NFRD on the level of disclosure, an additional analysis was incorporated to the aggregated impact displayed in Table 5. Consequently, five contrasts were initially established to statistically evaluate the individual change in the

Table 4 Post hoc comparisons—Sustainability *Source*: Own elaboration

	Mean difference	SE	*t*	Cohen's d effect sizes	p_{holm}
ENV					
SLC	−0.242	0.056	−4.336	−0.703	< .001***
EMPL	−0.155	0.056	−2.775	−0.450	0.047*
HR	−0.023	0.056	−0.412	−0.067	0.682
AB	0.091	0.056	1.626	0.264	0.332
SLC					
EMPL	0.087	0.056	1.561	0.253	0.332
HR	0.219	0.056	3.924	0.637	0.002**
AB	0.333	0.056	5.962	0.967	< .001***
EMPL					
HR	0.132	0.056	2.363	0.383	0.111
AB	0.246	0.056	4.401	0.714	< .001***
HR					
AB	0.114	0.056	2.038	0.331	0.188

P value adjusted for comparing a family of 10

Results are averaged over the levels of time

ENV Environment, *SLC* Social local communities, *EMPL* Employees, *HR* Human rights, *AB* Anti-corruption and bribery

*$p < .05$; **$p < .01$; ***$p < .001$

Table 5 Custom contrast—Time * Sustainability *Source*: Own elaboration

Comparison before versus after	Estimate	Cohen's d effect sizes	SE	*df*	*t*	*p*
ENV	0.098	0.265	0.141	25,166	0.692	0.495
SLC	0.094	0.147	0.141	25,166	0.664	0.513
EMPL	0.067	0.176	0.141	25,166	0.472	0.641
HR	0.033	0.053	0.141	25,166	0.230	0.820
AB	0.156	0.227	0.141	25,166	1106	0.279

ENV Environment, *SLC* Social local communities, *EMPL* Employees, *HR* Human rights, *AB* Anti-corruption and bribery

level of disclosure in each of the blocks (Environment, Social local communities, Employees, Human rights, and Anti-corruption and bribery) before and after. In this context, Table 5 illustrates how the main differences between the periods before and after the transposition appeared in the Anti-corruption and bribery, Environment, and Social local communities blocks, with differences of around 15% for the first one and around 10% for the latter two. While these differences did not reach statistical significance due to limited statistical power, a closer examination of effect sizes revealed that the environmental component demonstrated a medium effect, according to Cohen's classification. Importantly, the absolute mean differences, illustrating a sustainability reporting decline of around two digits, underscore a relevant effect size, indicating a clear downward trend in the reporting behaviour of the companies. These individual results by block align with the average aggregated before–after effect shown in Table 3.

Discussions

The analyse of SRs within the agri-food sector unveils a prevailing trend of relatively low average disclosure levels among the companies examined during both periods, specifically 57.13% and 48.19% before and after the transposition of the NFRD, respectively. These low disclosure levels found in the agri-food sector align with two previous studies, the only ones known to the authors, one conducted before the Spanish transposition of the NFRD (Baviera-Puig et al. 2014) and the other after the Spanish transposition of the NFRD (Anguiano-Santos and Salazar-Ordóñez 2022). Our study not only corroborates the prevailing trend of low disclosure, but also pinpoints an average decrease of 8.94% in the aftermath of the Spanish transposition of the NFRD. Although this decrease may not be statistically significant due to the limited sample size, its relevance is underscored by the magnitude of the effect observed. This downward trend is consistent with findings in the energy sector, where Dumitru et al. (2019) documented a similar decrease of 1.47%. However, this narrative diverges when juxtaposed with studies such as those by Lippai-Makra et al. (2021) and Matuszak and Różańska (2021), who reported an increase in disclosure among listed Hungarian and Polish companies by 4.27% and a substantial 51.37%, respectively. Consequently, it appears that while disclosure levels tend to decrease in studies focusing on a single sector, they increase when multiple sectors are analysed. It is crucial to note that these studies encompass multi-sector analyses, rendering direct comparisons with the agri-food sector complex. Variations in disclosure dynamics across sectors could contribute to the observed differences. In our block-by-block analysis of NFRD's impact, we observed a consistently low average level of disclosure within the Environment block preceding NFRD transposition. Comparative studies by Dumitru et al. (2019), Lippai-Makra et al. (2021), and Matuszak and Różańska (2021) have also underscored the low average disclosure levels prior to the NFRD, with rates of 34.64%, 33%, and 26.04%, respectively. This situation was further aggravated to Spanish and Hungarian companies after transposition, marked by a significant decrease of 9.77% and 1.78%, respectively (Lippai-Makra et al. 2021). In contrast, Dumitru et al. (2019) and Matuszak and Różańska (2021) identified improvements of 0.93% and a remarkable 52.10%, respectively. Notably, the latter study reported an impressive 85.10% disclosure level in the Environment block following the NFRD. It is important to underscore the paramount importance of environmental performance for stakeholders, which includes employees, investors, consumers, and society at large (Salazar-Ordóñez et al. 2013; Chaklader and Gulati 2015; Sobkowiak et al. 2020). The observed low level of disclosure in this block, coupled with the downward trend, is alarming and raises questions about the companies' commitment to sustainability. According to the Sustainability Accounting Standards Board (SASB), for the agri-food sector, disclosure within this block is particularly sensitive and material (SASB 2023), given the sector's significant water and energy consumption. Furthermore, the Banco Mundial (2021) reports that this sector is responsible for approximately one-third of greenhouse gas emissions, further emphasizing the need for transparency and accountability.

In the Social local communities block, Spanish companies exhibited a decrease in their disclosure level by 9.38%, revealing 75% prior to the NFRD transposition compared to 65.63% afterwards. In stark contrast, Matuszak and Różańska (2021) observed a substantial improvement, with an increase from 30.4 to 72.9% before NFRD transposition. For

the Employees block, Spanish companies reduced their disclosure by 6.67%, transitioning from 64.92 to 58.25%. Conversely, Polish companies achieved a diametrically opposite result, enhancing disclosure by 58%, escalating from 26.9% voluntarily disclosed to 84.9% after NFRD transposition. The Human rights block demonstrated the least variation after NFRD implementation, decreasing its disclosure by a mere 3.26%, from 50 to 46.74%. On the other hand, companies listed on the Polish stock exchange experienced an increase of nearly 52%, rising from 20 to 67.7%. Authors Dumitru et al. (2019) and Lippai-Makra et al. (2021) categorized these blocks (Social local communities, Employees, and Human rights) into a category termed "Social Issues". Within this category, Dumitru et al. (2019) observed a 3% decrease in the disclosure level for companies in the electrical sector, decreasing from 39.36 to 36.36%. In contrast, Lippai-Makra et al. (2021) noted a 10.42% increase in the disclosure level of Hungarian companies. Except for the Social local communities block, which encompasses the impact of the company on local communities (GRI 2017b) and is considered material by both academics and businesses (Bellantuono et al. 2018), the low level of disclosure in this set of blocks is striking given its administrative nature. This paucity of disclosure could be linked to the findings of Helfaya et al. (2023), who found that company board members tend to prioritize environmental and governance issues over social ones. According to researchers such as Clarkson et al. (2008), the information within these blocks does not represent a significant commitment on the part of the companies. This could explain the observed reporting patterns.

Finally, in the Anti-corruption and bribery block, our study revealed the lowest levels of information both before and after the Spanish transposition of the NFRD for agri-food companies. In a similar vein, energy companies (Dumitru et al. 2019), Hungarian companies (Lippai-Makra et al. 2021), and Polish companies (Matuszak and Różańska 2021) scarcely achieved a disclosure level of 10% prior to transposition. Following the transposition of the NFRD, both agri-food and energy companies witnessed decreases of 15.63% and 2.34%, respectively (Dumitru et al. 2019), while the disclosure levels of Polish (Matuszak and Różańska 2021) and Hungarian (Lippai-Makra et al. 2021) companies saw increases by 51% and 4.26%, respectively. The information encapsulated in this block includes the company's policies, commitments, complaint mechanisms, investigations, and sanctions (GRI 2017b). The low level of disclosure in this block, which is crucial for stakeholders who demand heightened transparency and integrity on a daily basis (Álvarez Etxeberria and Aldaz Odriozola 2018), could suggest a deficiency in a robust internal culture of compliance and ethics, thereby escalating the risk of improper practices (Interligi 2010).

The motivations behind these levels and variations of disclosure are multifaceted. On the one hand, Fiandrino et al. (2022) found that following the implementation of the NFRD, companies have merely complied with the law, leading to a deterioration in the quality of SRs. This aligns with the study by Dobbs and Van Staden (2016), who suggest that low levels of reporting could be a result of companies' disconnection from society and, therefore, their lack of commitment. On the other hand, these authors also point out that some companies produce their SRs to enhance their corporate image and reputation (De Villiers and Van Staden 2006). This would be consistent with those who highlight how some companies use SRs as a marketing tool due to their ability

to influence the decision-making of stakeholders (Moravcikova et al. 2015; Pizzi et al. 2021). Therefore, the observed decrease in disclosure could be because some companies might have been engaging in Greenwashing practices, where companies combine poor environmental performance with positive environmental communication (Delmas and Burbano 2011). This fact would explain why the European Commission does not find evidence to support 40% of the sustainability messages issued by European companies (Forética 2023). Lastly, it should also be considered that in Spain, following the transposition of the NFRD, external audits have become mandatory, which could have led agri-food companies to merely comply with the law to reduce costs (Fiandrino et al. 2022). In this regard, the decrease in the average level of disclosure could mean that the information contained in the SRs is now more accurate and reliable, or conversely, it may have incentivized companies to merely comply with the law to avoid penalties and reduce costs, resulting in the consequent omission of information. Therefore, these results fuel the debate on whether the NFRD has had a positive impact on the preparation of SRs (Dumitru et al. 2017, 2019; Leopizzi et al. 2020; Di Tullio et al. 2019; Carungu et al. 2020; Arif et al. 2021; Matuszak and Różańska 2021; Ottenstein et al. 2021; Cosma et al. 2021; Korka et al. 2021; Lippai-Makra et al. 2021).

Conclusions

The transposition of the NFRD into Spanish law (Law 11/2018) has not been successful in enhancing the level of disclosure in the SRs of agri-food companies. This highlights the critical need for policy makers to formulate specific regulations or standards that mandate companies to disclose information in a more detailed and standardized way, ensuring stringent compliance, similar to the handling of financial information. This suggestion entails the establishment of a legal framework that sets specific standards and requirements for the preparation of SRs. Additionally, the governments of the EU could advocate for incentives and training programmes to clarify and simplify the preparation of SRs, thereby enhancing the overall quality of non-financial information.

In the business realm, Spanish agri-food companies, which have a wide margin for improvement in disclosure practices, should adopt proactive measures to enhance their non-financial outcomes. Since internal audits are currently not required, an effective strategy could be the implementation of self-assessment mechanisms and the establishment of clear objectives for the future. In this regard, promoting systems that ensure feedback from their stakeholders would help set the goals to be achieved. Furthermore, companies can leverage comprehensive information and data management systems to streamline the reporting process, ensuring efficiency and accuracy. By improving non-financial information, companies not only benefit themselves, but also contribute to social welfare, promoting responsible business practices and actively participating in the collective pursuit of a more sustainable future.

Abbreviations

AB	Anti-corruption and bribery
BDI_i	Disclosure level for each block
CSR	Corporate social responsibility
EBITDA	Earnings before interests, tax, depreciation and amortization
ENV	Environment
EMP	Employees

EP	Economics performance
EU	European Union
FHI	Financial health indicators
GRI	Global reporting initiative
HR	Human rights
IDI_i	Indicator disclosure index
kSBI	Number of sub-block
IB	Number of blocks
mIDI	Number of indicators
MDI_i	Mean disclosure index
n	Number of companies
NFRD	Non-Financial Reporting Directive
PCA	Principal component analysis
PM	Profitability metrics
ROA	Return on assets
ROE	Return on equity
SBI_i	Disclosure level for each sub-block
SLC	Social local communities
SR	Sustainability report

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CA was responsible for the literature review, data collection, investigation, and content analysis, and wrote the manuscript text. MR performed statistical analysis, software, supervision, reviewing, and contributed to editing the manuscript. Both authors read and approved the final manuscript.

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Availability of data and materials
The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Competing interests
The authors declare no competing interests. Furthermore, it is warranted that the article and its parts have not been previously published in any other source and that it does not involve studies with human or animal participants conducted by any authors. In addition, all authors consent to the publication of the manuscript.

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