THE LEVEL OF DISCLOSURE OF SUSTAINABILITY INFORMATION OF CREDIT UNIONS IN BRAZIL AND GERMANY

NÍVEL DE EVIDENCIAÇÃO DE INFORMAÇÕES DE SUSTENTABILIDADE DE COOPERATIVAS DE CRÉDITO DO BRASIL E DA ALEMANHA

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Abstract
This research aims to analyze the level of disclosure of sustainability information, which mitigates information asymmetry, of Brazilian and German credit unions. The study was developed with a sample of Brazil and Germany's 30 largest cooperatives in this field, totaling 60 credit unions. Calculating the disclosure level, was taken by 60 indicators, in four categories of representative sustainability information, analyzed in the annual reports of the cooperatives that make up the sample. The results demonstrate a statistically significant difference when observing the disclosure of the 60 indicators, with German cooperatives disclosing more sustainability information in their annual reports than Brazilian cooperatives. Furthermore, when considering the four categories of indicators (economic, social, environmental, and cultural) individually, there was a statistically significant difference in the disclosure of economic and environmental information between Brazil and Germany, with German credit unions also disclosing more information on this nature than Brazilian credit unions. However, the difference in the disclosure of information in the social and cultural pillars could not be proven in the analyzed sample.
Key words: Credit unions; Disclosure; Sustainability; Governance.

Resumo
O objetivo desta pesquisa é analisar o nível de evidenciação de informações de sustentabilidade, que mitigam a assimetria de informação, das cooperativas de crédito brasileiras e alemãs. O estudo foi desenvolvido com uma amostra das 30 maiores cooperativas deste ramo do Brasil e da Alemanha, totalizando 60 cooperativas de crédito. Para cálculo do nível de evidenciação, foram utilizados 60 indicadores, divididos em quatro categorias de informações representativas de sustentabilidade, analisados nos relatórios anuais das cooperativas que compõem a amostra. Os resultados demonstram que houve diferença estatisticamente significativa quando observada a evidenciação dos 60 indicadores, com as cooperativas alemãs divulgando mais informações de sustentabilidade em seus relatórios anuais que as cooperativas brasileiras. Ao considerar as quatros categorias de indicadores (econômico, social, ambiental e cultural) individualmente, constatou-se uma diferença estatisticamente relevante entre a evidenciação de informações econômicas e ambientais entre Brasil e Alemanha, com as cooperativas de crédito alemãs também divulgando mais informações desta natureza que as cooperativas de crédito brasileiras. Todavia, a diferença na evidenciação das informações nos pilares social e cultural não pôde ser comprovada na amostra analisada.
***Palavras-chave**: Cooperativas de crédito; Evidenciação; Sustentabilidade; Governança.*

1. Introduction

Credit unions are known by different names depending on the country in which they are located. For example, in Brazil, they are referred to as "credit cooperatives". At the same tome, in the United States, they are called "credit unions", and in Canada, they are referred to as "caisse populaire". In Europe, they are commonly known as "cooperative banks," and this organizational form represents the primary structure of these institutions. Other names for credit unions include "savings and credit cooperatives" and "Shinkin Banks" in Japan. These different names reflect the varied institutional and organizational structures, product availability,

business models, and legal and regulatory frameworks that differ across countries, particularly between developed and emerging nations (Cuevas & Buchenau, 2018; McKillop et al., 2020).

Credit unions are considered fundamental actors in the economic and social development of the communities where they operate, primarily due to their role in mobilizing savings and providing credit. The essence of credit unions is rooted in their focus on maximizing the well-being of local communities. In southern European countries, credit unions are expanding their lending activities to small businesses in areas significantly affected by bank consolidation, highlighting the complementary and relevant aspect of credit granting and financial intermediation played by these economic agents. Additionally, credit unions are believed to be better equipped to withstand macroeconomic shocks on their balance sheets. Several studies have examined the resilience and stability of credit unions in various economic contexts, highlighting their potential as alternative financial institutions that can contribute to more sustainable and inclusive economic growth (Ely & Robinson, 2009; Smith & Woodbury, 2010; Smith, 2012; Hasan et al., 2014; Migliorelli, 2018).

Establishing legal and regulatory frameworks that conform to the organizational nature and institutional structure of local entities, particularly concerning their governance and capital structure, is indispensable for ensuring the stability and growth of the credit union system. Therefore, effective governance and regulatory frameworks and the reduction of information asymmetry, are critical for building a robust and sustainable financial cooperative system. Moreover, to address information asymmetry, disclosure of sustainability information is essential, particularly for cooperatives, which operate according to cooperative principles. To this end, a set of 60 indicators encompassing information on sustainability from the stakeholders' perspective was employed to assess and compare the thirty largest credit unions in Brazil and Germany (Cuevas & Buchenau, 2018; Macagnan & Seibert, 2021; Yakar Pritchard & Çaliyurt, 2021).

The present study aims to analyze credit unions in Brazil and Germany, given their relevance and potential in these countries, as indicated by various sources (BVR, 2022a, 2022b; Confebras, 2022; OCB, 2022). Moreover, Germany, the birthplace of credit unions, provides an exciting comparison object. The study's findings reveal a statistically significant difference in the disclosure of 60 sustainability indicators, with German cooperatives exhibiting greater disclosure in their annual reports than Brazilian cooperatives. This difference in disclosure was particularly noticeable in the economic and environmental categories, where German credit unions provided more information than their Brazilian counterparts. However, the social and cultural categories did not show significant differences between the two countries.

Based on the previous review, the objective of this study is to assess the extent of sustainability information disclosure in credit unions from Brazil and Germany, by conducting a comparative analysis of the disclosure practices in these countries. As such, this study offers valuable insights to credit union organizations in both countries, enabling them to identify areas of improvement in their sustainability reporting practices. Moreover, this research is expected to contribute to the existing literature on the subject, given the limited studies that compare credit unions across different countries.

The article is organized into several sections, starting with an introduction that outlines the research problem, objectives, and theoretical framework. The methodology employed in this study is then presented, followed by a discussion of the results obtained. Finally, the article summarizes the essential findings and their implications for credit unions, and provides suggestions for future research. The reference list is also included at the end of the article.

2. Literature Review

This section addresses a brief history of credit unionism is addressed, its peculiarities regarding governance and sustainability, and also the intrinsic characteristics related to credit unions, both Brazilian and German.

2.1 History of Credit Unions

The inspiration for cooperative ideals can be traced back to Britain, particularly through the Rochdale Society of Equitable Pioneers, where 28 workers joined forces in 1844 to establish their cooperative food-selling store. Another source of inspiration came from New Lanark, Scotland, where Robert Owen and other mill owners agreed to limit their returns on invested capital and use the accumulated residual profits to benefit the community. Subsequently, after agrarian reform and the emancipation of peasants, a group of small farmers who were entirely devoid of capital emerged, depending on credit from shopkeepers, agricultural product merchants, and other informal creditors. As a result, credit was not only expensive but also scarce, contingent on the purchase of other products, and credit relationships depended partly on some other transaction, leading to explicit and implicit costs that reached an annual rate of 30% (Royle, 1998; Guinnane, 2001; Merrett & Walzer, 2004; Walton, 2015).

Against this backdrop, cooperative financial institutions emerged in Germany as philanthropic self-help institutions encouraging workers to pool resources and save money. A politician and judge, Hermann Schulze-Delitzsch founded the first urban credit union in Germany in 1850 to address some of the credit supply problems. Around the same time, the first rural credit union was established in 1862 by Friedrich Wilhelm Raiffeisen, the mayor of West Rhineland, Germany. Although contemporaries, the two pioneers of the cooperative movement in Germany operated in different spheres, with Schulze-Delitzsch focusing on urban centers and Raiffeisen directing his efforts to rural areas, serving different geographical groups of people. However, both shared the experience of the low economic and social development of the mid-nineteenth century. Friedrich Wilhelm Raiffeisen emphasized Christian principles as motivation for creating of the first rural credit union. His cooperative model quickly spread to neighboring countries such as Austria, Belgium, Switzerland, and the Netherlands, with notable cooperatives created by Luigi Luzzatti in Italy (MacPherson, 1979; Aschhoff, 1982; Moody & Fite, 1984; Kaushik & Lopez, 1994; Walter, 2006; Mook et al., 2015; McKillop et al., 2020).

One noteworthy aspect of the early credit unions is the intentional restriction of their operations to a small number of individuals and a limited geographic area. For example, in the credit union model pioneered by Raiffeisen, which evolved into the Raiffeisenbank federation in 1913, a significant majority of members (i.e., 80%) were situated in localities with 3,000 inhabitants or fewer. For the leaders of these cooperatives, constraining operations to a small geographic area, such as a village or several villages, enabled members to develop an intimate knowledge of each other's habits, character, and abilities. Consequently, the cooperative could effectively screen potential borrowers, monitor loans and payments, and impose economic and non-economic sanctions on defaulters at a relatively low cost. Another noteworthy aspect of this model was that cooperatives, rooted in local communities, tended to deny membership to individuals residing outside of their own area. Furthermore, members who were expelled from one credit union due to non-payment of loans were effectively excluded from all other credit unions. Such mechanisms could be considered rudimentary forms of corporate governance (Guinanne, 2001).

In Brazil, the first cooperative was established in 1889 in Minas Gerais, under Sociedade Cooperativa Econômica dos Funcionários Públicos de Ouro Preto. However, the founding of the Cooperativa Caixa de Economias e Empréstimos de Nova Petrópolis in 1902 by the Jesuit priest Theodor Amstad is considered the starting point of credit unions in Brazil. According to

Meinen and Port (2016), Father Amstad was inspired by the Raiffeisen model, which he was familiar with from his experience in Germany. With the passage of Decree Law 979 in 1903 and Decree Law 1.637 in 1907, the Brazilian cooperative movement grew, creating new cooperatives and encouraging the emergence of others. Credit unions thus became an important source of financing for agricultural activities, providing credit even for land acquisition. An example of this expansion is the formation of the first Brazilian central cooperative of credit, named Central das Caixas Rurais da União Popular do Estado do Rio Grande do Sul, in 1925, when 18 cooperatives in Rio Grande do Sul joined together (Meinen & Port, 2012; de Freitas & de Freitas, 2014; Meinen & Port, 2016).

Between the 1940s and 1960s, Luzzatti model of credit unions was a considerably expanded, particularly in the southern and southeastern regions of Brazil. However, through Law 4.595 of 1964, which reformed the National Financial System, and other laws and decrees, credit unions were equated with other financial institutions, which ended up significantly hampering and restricting credit cooperativism, resulting in the near-total liquidation of cooperatives in this sector (Pinho, 2004; Meinen & Port, 2012; de Freitas & de Freitas, 2014; Meinen & Port, 2016).

With the implementation of the OCB System, through Law 5.764/71, and later with the promulgation of the 1988 Constitution, which prohibited state interference in associations, there was a considerable growth of credit unions in the country, as it prioritized the self-management of cooperatives. In the period between 1996 and 2002, there was the internationalization of Brazilian cooperatives, the consolidation of credit confederations, and the evolution of the solidarity economy trend. From 2003 onwards, credit unions in Brazil became even more solidified through new rules for the constitution of this type of cooperative and the incentive to expand cooperative microcredit (Pinho, 2004).

2.2 Governance and sustainability in credit unions and the cooperative system

The principles of cooperation, when combined with the influential role of the state in enforcing limitations through laws, regulations, and supervision, while refraining from interfering with the autonomy of cooperatives, are conducive to their perpetuity and sustainability, as exemplified in developed nations such as the United States, Canada, numerous European countries, and notably, Germany. Therefore, apart from the state's regulatory and normative function, credit unions should establish and implement governance mechanisms to safeguard members' interests (Cuevas & Fischer, 2006; Soares & Ventura, 2008; Seibel, 2013; Cuevas & Buchenau, 2018).

According to Cuevas and Buchenau (2018), the fundamental principles of credit cooperatives are as follows:

1. Each member has one vote;
2. Disaggregation of votes and membership is not permitted;
3. Members provide and use funds;
4. Dividends, if any, are distributed to savers and borrowers in proportion to their participation in intermediation activities.

One aspect that deserves to be highlighted with regards to the organization of cooperatives is the dual role played by their members. According to Staatz (1987), members are both users and owners of the cooperatives they belong to. As such, members must pay attention to two distinct interests: their interests as users, which encompass issues related to the price and quality of the cooperative's products and services, and their interests as owners, which comprise aspects related to the management of the cooperative.

Despite the unique characteristics of credit unions, they are not immune to agency problems. Since each member holds only one vote, and there is no stock exchange quotation,

there is no incentive for extensive monitoring of decision-making agents. From the perspective of Agency Theory, as proposed by Jensen and Meckling (1976), addressing this issue through the mitigation of the principal-agent conflict constitutes a key factor for the solidity or failure of cooperatives. In addition, solid and efficient regulation, as well as supervision that considers this, are equally essential for the sustainability of credit unions (Aldrighi, 2006; Cuevas & Fischer, 2006; Soares & Ventura, 2008; Cuevas & Buchenau, 2018).

Because both the supervisory and management board members are also owners, given their responsibility, access to information, and technical knowledge, the specificity of credit unions' characteristics may encourage decisions that do not represent collective thinking, that is, the General Assembly. Therefore, in addition to internal rules and controls that consider such possibilities, clear rules are also necessary to prevent and inhibit issues related to credit decisions for themselves, close relatives, or board members. Furthermore, there is a need for monitoring and management supervision to avoid preference behavior for expenses. Another relevant aspect is succession, which is crucial for the sustainability of credit unions. However, it is often found that succession criteria are defined in a vague, deficient manner and without the necessary technical qualifications, compromising the governance and management of these entities (BCB, 2008; Soares & Ventura, 2008; Cuevas & Buchenau, 2018).

Information asymmetry is a pervasive issue in financial markets arising from one party possessing more and better information than another. One approach to alleviating this problem is disclosing information, which has been extensively explored in the literature (Leuz & Verrecchia, 2000). In the specific context of credit unions, a key strategy to mitigate information asymmetry is through adpting sustainability practices, which can enhance the transparency and accountability of these organizations to their members and the wider community (Macagnan & Seibert, 2021; Yakar Pritchard & Çalıyurt, 2021). Furthermore, the disclosure of sustainability practices may contribute to maintaining trust between stakeholders and the credit union, given the increasing importance of sustainability issues in the financial sector and the potential reputational and financial risks associated with adverse environmental or social impacts (Bollas-Araya, Seguí-Mas & Polo-Garrido, 2014).

It is worth noting that, in contrast to the Brazilian context, where no mandatory disclosure is in place, German companies with assets greater than € 40 million, net sales greater than € 20 million, or an average of at least 250 employees during the year, are compelled by the German Sustainability Code (DNK) to report on their sustainability performance in their annual reports (DNK, 2022). Furthermore, the European Parliament and the Member States of the European Union (EU) ratified Directive 2014/95 in 2014, expanding the reporting scope for large corporations operating in capital markets, credit institutions, financial service providers, and insurance companies. This directive aimed to increase transparency on environmental and social issues across EU-based corporations, focusing on environmental, social, and labor issues, respect for human rights, and the fight against corruption. Consequently, Germany enacted the Corporate Social Responsibility Implementation Act in 2017, mandating the inclusion of sustainability information in companies' management reports (CSR - Verantwortung Unternehmen, 2022). As such, German credit unions are legally obliged to disclose information regarding their environmental and social performance in their annual reports.

Table 1 presents data on Brazilian and German credit unions, as of December 31, 2021, according to information sourced from the Confederação Brasileira das Cooperativas de Crédito (Confebras, 2022) and the Bundesverband der Deutschen Volksbanken und Raiffeisenbanken (BVR, 2022a, 2022b).

Table 1 – Data on Brazilian and German cooperatives

Country	Number of single cooperatives	Number of member (in millions)	Net equity (in billions of €)*	Total assets in billions of €)*	Net income (in billions of €)*
Brazil	818	14.68	10.71	67.28	1.62
Germany	772	18.17	129.54	1,566.45	7.50

Source: Confebras (2022); BVR (2022a, 2022b).
* To convert Brazilian Reais values to Euros, the official exchange rate from BCB (2022) was used, as of December 31, 2021 (€ 1,00 = R$ 6,3187).

As seen in Table 1, despite the similarity in the number of cooperatives and members, German credit unions have more significant figures when analyzing Net equity, Total assets, and the Net income in 2021.

3. Methodology

For this investigation, a non-random sample was employed to select the Brazil's 30 largest credit unions and Germany's 30 largest credit unions, ranked by Total assets, considered the most relevant within the countries under study. Data for this sample was sourced from the Confebras (2022) and the Bundesverband der Deutschen Volksbanken und Raiffeisenbanken (BVR, 2022a) websites. As a result the, total number of Brazilian credit unions in 2021 was 818, while German credit unions amounted to 772 in the same year.

In the initial phase of this research, the sustainability indicators formulated by Macagnan and Seibert (2021) were adapted. This modification was necessary to exclude one of the social indicators related to FATES, since mandatory retention of values for technical, educational, or social purposes is not provided for under German cooperative legislation. Consequently, out of the 61 indicators, 60 were utilized in this research, categorized into the economic, social, environmental, and cultural pillars, as illustrated in Chart 1.

Chart 1 - Sustainability indicators

PILLAR	Indicator
Economic	Financial Statements: Balance sheet and income
	Investments
	Audit report
	Loans and financing
	Cash flow
	Economic and financial performance indicators
	Member benefits/Participation in surplus
	Management report
	Supervisory board report
	Collaborator benefits/participation in surplus
	Strategic planning
	Fines and litigation
	Payroll
	Compliant/Defaulting members
	Management remuneration
	Directors' remuneration
	Member's turnover
	Collaborator's turnover
	Budget (realized x budgeted)
	Job and salary plan
	Actions and social campaigns of the cooperative

Social	Members' number
	Social projects
	Continuing education program
	Cooperative principles
	Collaborators' number
	Cooperative governance structure
	Integration programs
	Social programs
	Ethics and conduct code
	Bylaws
	Technical assistance
	Social report
	Continuing education for members
	Social performance indexes
	Members benefit plan
	Collaborators benefit plan
Environmental	Environmental education and awareness campaigns
	Environmental sustainability policies
	Incentivize conscious consumption campaign
	Technology for sustainability
	Natural resources consumption
	Environmental preservation project
	Sustainability report
	Recycling and waste treatment program
	Pollutants reduction
	Environmental permits
	Environmental legislation
	Environmental investments return
	Environmental fines and litigation
Cultural	Cooperative history
	Cooperative mission, vision, principles, and values
	Cultural actions developed by the cooperative
	Sponsorship of actions/activities in local and regional culture
	Encouraging local and regional culture
	Awards and certifications
	Events to strengthen cooperative identity
	Cooperative education program
	Library (physical or virtual) on cooperatives
	Policies for hiring children (relatives) of members

Source: adapted from Macagnan & Seibert (2021)

The subsequent step involved the analysis of credit unions within the sample. In contrast to Macagnan and Seibert (2021), who examined cooperative websites and annual reports, this paper analyzes only the credit unions' annual reports, as they are the primary source of information that cooperatives use to communicate with the members about their activities and annual results directly. Notably, the reports were obtained from the sample cooperatives' websites, and the latest report was always downloaded, i.e., the report for 2020 was downloaded for some cooperatives, while that for 2021 was downloaded for others. For each item identified in the annual report, one point was added to the index; therefore, the total index score is 60. Furthermore, the sum was segregated for each of the pillars to observe whether there were differences in the pillars between Brazilian and German cooperatives.

Subsequently, with the index values in hand, a descriptive analysis of the results of Brazilian and German cooperatives was performed separately. The analyzed results were the total index scores, with a maximum sum of 60; the economic pillar scores, with a maximum

value of 20; the social pillar scores, with a maximum value of 17; the environmental pillar scores, with a maximum sum of 13; and the cultural pillar scores, with a maximum value of 10.

Finally, a hypothesis test was performed to verify whether the mean of the indices of the group of Brazilian cooperatives were equal to or different from those of the German cooperatives. The tests used were the Student's t-test for independent samples, the t-test for independent samples with Welch correction, and the Mann-Whitney U test, depending on the normality assumptions (Shapiro-Wilk) and homoscedasticity (Levene) found in the sample. Thus, it was possible to compare whether Brazilian cooperatives have the same level of compliance with the suggested sustainability indicators as German credit unions. (Freund, 2006)

The study also presents some limitations, such as subjective recognition of sustainability practices in credit union reports, which may lead to different conclusions in future studies using the same sample. Additionally, the sample may be considered small, precluding the use of more robust statistical tests. Finally, the research findings cannot be generalized to all cooperatives or all cooperative sectors, since a limited sample of credit unions from each country was used.

4. Results and Discussion

In this section, the research results are presented and discussed. In Table 2, the results of the level of sustainability disclosure overall are demonstrated, including all 60 indicators adapted from Macagnan and Seibert (2021).

Chart 2 - Results of the level of sustainability disclosure of Brazilian and German cooperatives

Cooperative	Level of disclosure		Cooperative	Level of disclosure	
	Points	Percentage		Points	Percentage
Cooperative 17 Brazil	34	56.67%	Cooperative 5 Germany	38	63.33%
Cooperative 2 Brazil	31	51.67%	Cooperative 6 Germany	36	60.00%
Cooperative 1 Brazil	30	50.00%	Cooperative 4 Germany	35	58.33%
Cooperative 4 Brazil	30	50.00%	Cooperative 1 Germany	33	55.00%
Cooperative 3 Brazil	27	45.00%	Cooperative 23 Germany	32	53.33%
Cooperative 7 Brazil	26	43.33%	Cooperative 8 Germany	31	51.67%
Cooperative 8 Brazil	26	43.33%	Cooperative 3 Germany	30	50.00%
Cooperative 27 Brazil	26	43.33%	Cooperative 16 Germany	30	50.00%
Cooperative 18 Brazil	24	40.00%	Cooperative 13 Germany	29	48.33%
Cooperative 24 Brazil	22	36.67%	Cooperative 17 Germany	29	48.33%
Cooperative 16 Brazil	21	35.00%	Cooperative 19 Germany	29	48.33%
Cooperative 9 Brazil	20	33.33%	Cooperative 14 Germany	28	46.67%
Cooperative 15 Brazil	19	31.67%	Cooperative 15 Germany	28	46.67%
Cooperative 13 Brazil	18	3000%	Cooperative 18 Germany	28	46.67%
Cooperative 28 Brazil	18	30.00%	Cooperative 21 Germany	27	45.00%
Cooperative 29 Brazil	18	30.00%	Cooperative 22 Germany	27	45.00%
Cooperative 12 Brazil	17	28.33%	Cooperative 25 Germany	27	45.00%
Cooperative 30 Brazil	17	28.33%	Cooperative 28 Germany	27	45.00%
Cooperative 6 Brazil	16	26.67%	Cooperative 26 Germany	26	43.33%
Cooperative 21 Brazil	16	26.67%	Cooperative 30 Germany	26	43.33%
Cooperative 25 Brazil	16	26.67%	Cooperative 7 Germany	23	38.33%
Cooperative 11 Brazil	15	25.00%	Cooperative 9 Germany	23	38.33%
Cooperative 20 Brazil	15	25.00%	Cooperative 2 Germany	22	36.67%
Cooperative 22 Brazil	15	25.00%	Cooperative 11 Germany	22	36.67%
Cooperative 14 Brazil	14	23.33%	Cooperative 20 Germany	20	33.33%
Cooperative 19 Brazil	13	21.67%	Cooperative 10 Germany	19	31.67%
Cooperative 23 Brazil	12	20.00%	Cooperative 27 Germany	18	30.00%
Cooperative 5 Brazil	9	15.00%	Cooperative 12 Germany	14	23.33%

Cooperative 10 Brazil	9	15.00%	Cooperative 24 Germany	14	23.33%
Cooperative 26 Brazil	7	11.67%	Cooperative 29 Germany	11	18.33%

Source: prepared by the authors

Chart 2 displays the extent of sustainability information disclosure by Brazilian and German credit unions, classified by both score (ranging from 0 to 60) and percentage (from 0% to 100%). Notably, the Brazilian credit union "Cooperative 17" is the one that discloses the most proposed sustainability indicators, with 34 items disclosed and a disclosure level of 56.67% of the information. Similarly, the German credit union "Cooperative 5" discloses the most proposed sustainability indicators, scoring 38 out of 60 (equivalent to a disclosure level of 63.33%). Conversely, "Cooperative 26", in Brazil, has the lowest level of disclosure, with 7 items disclosed or 11.67% of the disclosed information. In contrast, "Cooperative 29", in Germany, discloses 11 items, representing a disclosure level of 18.33% of the information. Finally, Chart 3 presents a descriptive analysis of the overall sustainability results.

Chart 3 - Descriptive analysis of overall sustainability results

Description	Brazilian credit unions		German credit unions	
	Points	Percentage	Points	Percentage
Mean	19.4	32.3%	26.1	43.4%
Median	18	30%	27	45%
Stardard Deviation	6.94	11.6	6.49	10.8
Maximum	34	56.7%	38	63.3%
Minimum	7	11.7%	11	18.3%

Source: prepared by the authors

Chart 3 reveals that both the mean and median of Brazilian and German credit unions are different, with the mean disclosure of sustainability indicators being 19.4 points or 32.3% for Brazilian cooperatives and 26.1 points or 43.4% for German cooperatives and a median of 18 points (30%) for Brazilian credit unions and 27 points (45%) for German cooperatives. First, however, it is necessary to analyze whether this difference is statistically significant. Thus, Chart 4 presents the results of Shapiro-Wilk's normality test and Levene's homoscedasticity test for the general level of disclosure, using a score of 0 to 60.

Chart 4 - Shapiro-Wilk and Levene's Test for overall disclosure level

Normality test (Shapiro-Wilk)	W	p-value
	0.990	0.906
Homoscedasticity test (Levene)	F	p-value
	0.404	0.527

Source: prepared by the authors

Hence, upon examining Chart 4, it becomes evident that the sample data follows a normal distribution (p-value = 0.906) and exhibits homogeneity of variances (p-value = 0.527), at a significance level of 0.05. Consequently, the Student's t-test is employed to assess the difference in mean values between the Brazilian and German credit union groups, as presented in Chart 5.

Chart 5 - Student's t-test for overall disclosure level

Statistic	df	p-value
-3.86	58.0	<0.001

Source: prepared by the authors

Hence, upon scrutinizing Chart 5, the statistical analysis demonstrates that the p-value of the comparison between the Brazilian and German cooperative groups was less than 0.001, at a significance level of 0.05. This result rejects the null hypothesis that the disclosure of proposed sustainability indicators is the same between Brazilian and German credit unions. Furthermore, it indicates that the difference in sustainability indicator disclosure between these two groups is statistically significant for the confidence interval. This finding reveals that German credit unions, on average, provide more sustainability information in their annual reports than Brazilian credit unions among those included in the sample.

Furthermore, the study also examined any disparity in the disclosure of information between the sustainability pillars. The descriptive statistical analysis of these results is shown in Chart 6, depicted in percentage values.

Chart 6 - Descriptive analysis of results segregated by sustainability pillars

Description	Economic		Social		Environmental		Cultural	
	Brazil	Germany	Brazil	Germany	Brazil	Germany	Brazil	Germany
Mean	43.2%	51%	33.1%	37.5%	15.4%	56.7%	31%	21.3%
Median	45%	52,5%	29,4%	41,2%	7,69%	61,5%	35%	20%
Stardard Deviation	15.8	10.9	18.3	11.2	20.2	22.4	22.2	16.6
Maximum	75%	70%	70.6%	58.8%	69.2%	76.9%	60%	70%
Minimum	20%	30%	0%	11,8%	0%	0%	0%	0%

Source: prepared by the authors

Chart 6 reveals that German credit unions demonstrate a higher level of disclosure, as indicated by both the mean and median values, concerning the economic pillar when compared to their Brazilian counterparts. Furthermore, the same trend is observed with respect to the social and environmental pillars, wherein the difference between the two groups is particularly noteworthy in the case of the environmental pillar, where German cooperatives exhibit a substantially higher mean and median of 56.7% and 61.5%, respectively, compared to Brazilian cooperatives, whose mean and median values are significantly lower at 15.4% and 7.69%, respectively.

Upon analysis of the cultural pillar, it was observed that Brazilian credit unions display higher means and medians compared to their German counterparts. Therefore, to test for statistically significant differences between the Brazilian and German sample groups, mean difference tests were performed for each pillar, including the economic, social, environmental, and cultural domains. However, before conducting the tests, it was imperative to evaluate the normality and homoscedasticity of the sample data, which is detailed in Chart 7.

Chart 7 - Shapiro-Wilk test and Levene test for the level of disclosure segregated by sustainability pillars

	Economic		Social		Environmental		Cultural	
Normality test (Shapiro-Wilk)	W	p-value	W	p-value	W	p-value	W	p-value
	0.974	0.217	0.987	0.790	0.936	0.004	0.956	0.029
Homoscedasticity test (Levene)	F	p-value	F	p-value	F	p-value	F	p-value
	4.11	0.047	9.59	0.003	-	-	-	-

Source: prepared by the authors

As demonstrated in Chart 7 and applying a significance level of 0.05, the analysis reveals that the data related to the economic and social sustainability pillars demonstrate normality, but lack homoscedasticity. Consequently, the Welch's t-test examined the statistical

differences between these two pillars. Conversely, the data about the environmental and cultural pillars did not satisfy normality assumptions, thus prompting the use of the Mann-Whitney U-test. The findings of the mean difference tests for the sustainability pillars are detailed in Chart 8.

Chart 8 - Mean difference tests segregated by sustainability pillar

	Economic		Social		Environmental		Cultural	
Teste t de Welch	Stat.	p-value	Stat.	p-value	-	-	-	-
	-2.24	0.029	-1.10	0.276	-	-	-	-
Teste U de Mann-Whitney	-	-	-	-	Stat.	p-value	Stat.	p-value
	-	-	-	-	107	<0.001	340	0.1

Source: prepared by the authors

Upon scrutiny of Table 8, the null hypothesis positing the equivalence of sustainability indicator disclosure for the social and cultural pillars across Brazilian and German cooperatives cannot be rejected. The discernible lack of statistical significance regarding the difference in sustainability indicator disclosure for these two pillars between Brazilian and German cooperatives is noted at a predetermined significance level of 0.05.

Notwithstanding, upon examination of sustainability indicator disclosure about the economic and environmental pillars, a real discrepancy emerges between Brazilian and German cooperatives. Specifically, German credit unions demonstrate a superior mean level of disclosure for this type of information compared to their Brazilian counterparts, notably concerning the environmental pillar. As evinced in Chart 6, German cooperatives exhibit an average economic information disclosure rate of 51%, while Brazilian cooperatives present an average disclosure rate of 43.2% for this category. The statistical significance of this disparity is validated by Welch's t-test, with a p-value of 0.029, as depicted in Chart 8. Given the available information, the cause of this variation in economic information disclosure between German and Brazilian cooperatives cannot be ascertained. Nonetheless, Westphal (2008) elucidates that German cooperatives typically prioritize the economic dimension, while in Brazil, greater emphasis is placed on the social function of cooperatives.

A notable difference in the disclosure of sustainability indicators can be observed regarding the environmental dimension of sustainability, which is more pronounced than in the economic dimension. This observation is supported by the data presented in Chart 6, which indicates that German credit unions exhibit an average disclosure rate of 56.7% for environmental information. In comparison, their Brazilian counterparts report an average of 15.4% for this type of information. This disparity is statistically significant, as demonstrated by Chart 8, where the p-value for the observed difference is less than 0.001, indicating a statistically significant result at the 0.05 significance level. One potential explanation for this observation is that German credit unions are subject to the Corporate Social Responsibility Implementation Act, which requires companies, including credit unions, to disclose non-financial information related to CSR, in compliance with the EU Directive 2014/95. As a result, there is a certain degree of standardization regarding the disclosure of information related to CSR, particularly regarding the environmental sustainability dimension, which is apparent in the reports of German credit unions.

It is worth noting that the disclosure of sustainability information may extend beyond the confines of annual reports, encompassing other reports disseminated by the cooperatives or featured on the institutional websites of the cooperatives represented in the sample.

5. Conclusion

This study aimed to examine the pertinent sustainability information that reduces information asymmetry in Brazilian and German cooperatives, while also drawing a comparison between the sustainability information disclosure practices of Brazilian and German credit unions. Based on an analysis of the annual reports of the 30 most prominent credit unions in both countries, a statistically significant discrepancy was observed in the overall disclosure of sustainability information, with German credit unions exhibiting a greater propensity to disclose such information in their annual reports.

When sustainability information is categorized by pillars (economic, social, environmental, and cultural), there is a statistically significant difference in the disclosure of economic and environmental information between German and Brazilian cooperatives. German credit unions disclose more information on average regarding the economic and environmental pillars compared to Brazilian credit unions. However, no statistically significant differences were found in the disclosure of the social and cultural pillars between the cooperatives of the two countries. The results obtained may be attributed to the obligation of German credit unions to disclose non-financial information related to social responsibility in their reports, but further studies are required to validate this proposition.

Another noteworthy aspect is that the disclosure index values of sustainability information for Brazilian and German cooperatives fell below the results of the most transparent cooperatives presented in the study by Macagnan and Seibert (2021). Although the authors focused on agricultural cooperatives, while the present study focused on credit unions, further investigation could shed light on this disparity in future research.

The research contributes significantly to credit unions by shedding light on the issues surrounding the disclosure of information in their annual reports. When properly emphasized, such information can mitigate information asymmetry among members. Furthermore, by comparing disclosure practices among organizations from different countries, a comprehensive overview can be obtained, aiding regulatory bodies in identifying areas that require improvement.

The findings of this study cannot be extrapolated to all cooperatives and cooperative sectors, given that a sample of 30 credit unions from each country was utilized. Hence, taking this into account, it is recommended to conduct studies with a larger sample of cooperatives, enabling more robust statistical techniques to confirm or refute the results obtained in this study. Future research may also consider using samples from cooperative organizations in other countries and sectors.

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