Integrating Sustainable Development Goals in corporate reporting: An international analysis of the financial sector

Master degree in International Business

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Leiria, September of 2023

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Dissertation submitted as requirement for the conferral of Master's Degree in International Management under the supervision of Professor Teresa Cristina Pereira Eugénio, Professor at the Escola Superior de Tecnologia e Gestão in Instituto Politécnico de Leiria and Professor Eulália Santos, Professor at the Escola Superior de Educação e Ciências Sociais at the Instituto Politécnico de Leiria

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Originality and Copyright

This dissertation is original, made only for this purpose, and all authors whose studies and publications were used to complete it are duly acknowledged.

Dedication

I dedicate this work to my girlfriend that has ben always been by my side, in all the good and bad moments.She always push and support me to be the greatest version of myself.

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Abstract

The United Nations' Sustainable Development Goals (SDGs) represent an[t1] holistic framework aimed to foster global sustainability by 2030, spanning critical social and environmental objectives. Achieving these goals necessitates collaboration between governments and the private sector. However, the financial industry role in supporting SDG attainment remains a subject of exploration. This dissertation investigates the evolution of the SDG theme within the financial industry and explores potential disparities based on bank ownership.

Utilizing textual analysis of annual and integrated reports from 2015 to 2022, drawn from a diverse database encompassing Latin American, American, and Asian banks, and considering bank ownership as an independent variable, this study addresses two key research questions: 1) How has the SDG theme evolved within the financial sector? and 2) Are there differences in the SDG disclosure on annual reports based on bank ownership?

The study adopts a threefold analysis approach: first, individual assessment of each SDG; second, a holistic examination of all SDGs collectively; and third, categorization by environmental, social, and economic dimensions within the financial sector. Statistical analyses are performed using software tools like Microsoft Excel and IBM SPSS Statistics 28. These findings provide critical insights for policymakers, stakeholders, and financial institutions navigating the complex landscape of sustainable banking and disclosure.

Applying Pearson correlation and t-tests to examine the inclusion of Sustainable Development Goals (SDGs) in banks' reports, the findings reveal a significant upward trend in SDG incorporation in the banking sector over time, particularly for SDG7 and SDG15. Public banks consistently mention more SDGs in their reports compared to private banks, when analyzed all SDGs collectively and when grouped by Environmental, and Social pillars. However, no significant differences were found when grouped by the Economic pillar.

Keywords: “Sustainable development goals;”, “Corporate report”, “Textual analysis”, “Financial sector”, “Triple bottom line”.

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List of Abbreviations and Acronyms

CO2	Carbon Dioxide
CSR	Corporate Social Responsibility
GAAP	Generally Accepted Accounting Principles
GRI	Global Reporting Initiative
IFRS	International Financial Reporting Standards
LLM	Language Model
MDG	Millennium Development Goals
NLP	Natural Language Processing
OCR	Optical Character Recognition
POB	Private-Owned Banks
S&P	Standard & Poor's
SDG	Sustainable Development Goals
SOB	State-Owned Banks
TBL	Triple Bottom Line
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development

1. Introduction

The United Nations (UN) has set forth the Sustainable Development Goals (SDGs) as a comprehensive blueprint for creating a better, more sustainable planet by 2030. These goals encompass a wide range of social objectives, such as eliminating hunger, eradicating poverty, ensuring quality education, promoting diversity, achieving gender equality, and reducing inequality, among others. Additionally, the SDGs include critical environmental targets, such as combating CO2 emissions, providing access to clean water and promoting clean energy usage, and safeguarding biodiversity in our oceans.

Achieving the SDGs necessitates the active involvement of governments and the private sector. It is through their collective efforts that we can embark on the transformative journey required to turn our world into a more habitable and sustainable planet (United Nations, 2020; 2015). As Bebbington and Unerman (2018) have noted, the Sustainable Development Goals (SDGs) are poised to open fresh avenues for research in the field of sustainability. These goals serve as a valuable reminder to international business researchers of areas within sustainable development that have been relatively overlooked. Furthermore, according to Bebbington et al. (2017), the SDGs and their potential have only recently started to gain prominence in the sustainability literature. This underscores the importance of additional research efforts in this emerging context.

Recently, the United Nations Conference on Trade and Development (UNCTAD) (2015) estimated that $5 to $7 trillion will be needed annually until 2030 to achieve the SDGs until 2030, and for developing countries it is expected an investment gap of $2.5 trillion. In this context, the financial industry will be a core industry to foster the achievement of the SDGs.

As banks have a crucial role in the economy, aggregating savings, reducing transaction costs and information gaps, promote savings, optimize resource allocation for large projects and driving growth while fostering innovation, Levine (2004), therefore they have a crucial role to support the achievements of the SDGs by financing the private and

public sectors on projects towards the Agenda 2030. But, how banks as an industry itself are linked to SDGs?

The ownership of the bank could change the logic of the business, as the state-ownership of a bank is mostly justified by market failures and development goals as (Stiglitz 1994; Levy- Yeyati, Micco, and Panizza 2007) emphasizes that public interventions can address market imperfections that lead to underinvestment in projects with high social returns.

Ferri et al. (2014a) argue that the bank ownership type influences banks' lending policies, Ture (2021) finds that lends from private banks are more procyclical and (Micco, Panizza, and Yanez 2007; Cull, Soledad Martínez Pería, and Verrier 2018). Find that private banks are more profitable than state owned banks in emerging and developing countries.

Two research question are derived from this context: how has the SDGs theme been evolving on the financial industry, and is there any difference depending on the ownership of the bank? From the 100 biggest banks in the world ("The world's 100 largest banks, 2022 | S&P Global Market Intelligence," 2022), we follow Hummel & Szekely (2021) by developing an automated textual analysis using python software on annual and integrated reports from 2015 to 2022. A descriptive and inferential statistical analysis was then conducted to answer these questions. Other studies have mainly focused on European banks, we innovate by using a different database containing data from Latin Americans, Americans and Asian banks and including the banks' ownership as independent variable on these analyses.

Our analysis is threefold: first, each SDG is assessed individually. Then we conduct a holist view of all SDGs together, and finally a grouping by environmental, social and economic on the financial sector is made, analysing Bank sector and differences for private banks and State-owned banks on mentioning SDG on their corporate reports using different software such as Microsoft Excel, IBM SPSS Statistics 28 software.

This study is organized as follow: first the literature review, second, the methodology used and the hypothesis, third, the descriptive and statistical analysis, after the results and finally the conclusion, limitation of the study and future research ideias.

2. Literature Review

2.1 Sustainable Development Goals

In 2012, the proposal to create the 17 SDGs (Figure 1) emerged at the Rio +20 United Nations Summit as a successor to the Millennium Development Goals (MDGs), the main objective is to conciliate economic growth, social inclusion, and environmental protection. This path to sustainable development started in 1992 when 178 countries adopted Agenda21 and after with the development of millennium goals which aimed to reduce extreme poverty by 2015 (THE 17 GOALS | Sustainable Development, 2023).

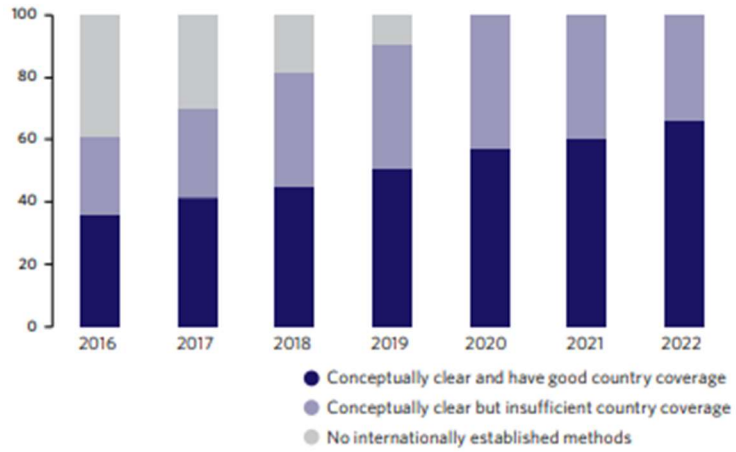
Figure 1: United Nations Sustainable Development Goals.

Source: The 17 goals | sustainable development (2023)

In September 2015, 193 countries agreed on the SDGs at the United Nations in New York, 17 goals (figure 1) were created to substitute the 8 MDGs, 169 targets to overcame 27 previous targets with a vision to expand the goals to all countries as a one world goal (THE 17 GOALS | Sustainable Development, 2023.).Using 231 unique indicators to measure and monitor the progress, which are reviewed every year, on the main framework it shows 248, but it's because some of the indicators affect two or more targets (SDG Indicators — SDG Indicators, 2023).

But even for the United Nations is complex to monitor the progress, only in 2020 they could rely on indicators that are conceptually clear and well established and has an agreed methodology accepted internationally with accuracy, reliability and comparability. Only 66% of all indicators have good country coverage, see Figure2, disaggregating indicators and geographic coverage are still an improvement for the robustness of the framework, but we could notice a good advance as in 2016 only 36% were indicators with good country coverage and clear methodology. (United Nations, 2023)

Figure 3: Proportion of global SDG indicators, by availability of standards and national data, 2016-2022(percentage)



Source: United Nations. (2023).

Studies have revealed that the SDGs represent a substantial advancement in global development and provide a thorough framework for addressing various interconnected issues (United Nations Development Programme, 2020). Research has also shown that the SDGs have the potential to drive economic growth while promoting social and environmental sustainability (Sachs, 2015; United Nations, 2015). Nevertheless, implementing the SDGs remains a significant challenge, and many countries face barriers such as limited resources, a lack of political will, and inadequate public awareness (United Nations, 2020; Kroll C, Zipperer V, 2020).

The role of education in promoting sustainable development and implementing the SDGs has also been explored in several studies (UNESCO, 2017; Abera, H. G, 2023). These studies have emphasised the importance of education in raising public awareness and promoting sustainable behaviour (Boud et al., 1985; Filho, W.L. et al. 2020; Wang, 2017). Research has also investigated the role of technology and innovation in promoting

sustainable development and achieving the SDGs (United Nations Development Programme, 2018).

Empirical evidence on the country-level institutional factors (e.g., politics and law, economics and finance, society and culture, technology and innovation, education and labour, and sustainability) (Rosati and Faria, 2019a); and organisational factors (e.g., a firm's size, higher level of intangible assets, higher commitment to sustainability frameworks and external assurance, higher proportion of female directors and younger board of directors) influencing to SDG reporting (Rosati and Faria, 2019b)

Also, there has been a significant amount of research focused on the role of governments in implementing the SDGs. These studies have emphasised the significance of government policies in promoting sustainable development and achieving the SDGs (United Nations Environment Programme, 2017; United Nations, 2020). The importance of partnerships between governments, the private sector, and civil society has also been emphasised in some studies (KPMG, 2017). Additionally, the role of business in implementing the SDGs has been studied, with research suggesting that companies can make a significant contribution to achieving the goals (United Nations Global Compact, 2018; World Business Council for Sustainable Development, 2020).

The integration of the SDGs into business and economic systems is crucial for achieving the goals. A paper by Ruggie (2015) highlighted the importance of integrating the SDGs into business and economic systems and stressed the need for companies to adopt a proactive approach to the SDGs, taking into account the potential risks and benefits of working towards the goals. SDGs provide a roadmap for the future and that companies need to prioritise the goals in their strategies and operations.

Eccles and Serafeim (2013) highlighted the importance of integrating sustainability into business strategies and stressed the need for companies to adopt a long-term perspective on sustainability, the companies need to adopt a holistic approach to sustainability that considers the economic, social, and environmental impacts of their operations.

The significance of the private sector in the successful implementation of the SDGs cannot be overstated. Its unmatched expertise in process design, adept management skills, control of resources, and expansive global reach position it as a crucial driving force for achieving these goals, demanding a disruptive and intelligent system redesign as the key to success. Yiu, L., & Saner, R. (2017)

Numerous research studies have shown that integrating the Sustainable Development Goals (SDGs) into a company's plans and strategies can have positive effects (Adams, 2017; Mukhi and Quental, 2019; Qin et al., 2019). These studies mainly focus on how companies in sectors like Tourism, Mining, and Oil & Gas are changing the way they do things to benefit the environment (Monteiro et al., 2019; Morioka et al., 2017; Musavengane, 2019). Some experts, like Liu et al. (2018) and Bebbington and Unerman (2018), say that companies should change the way they report on environmental matters to support long-term sustainability and not just focus on academics, as policymakers also care about the SDGs.

Other studies look at how foreign investment and governments are contributing to new business practices in less developed areas (Kourula et al., 2017; van Zanten and van Tulder, 2018; Pineda-Escobar, 2019). However, there are challenges in studying the SDGs and businesses, as Schaltegger (2018) points out, because there are still some missing links between businesses and the specific goals of the 2030 Agenda. Additionally, Caldera et al. (2018) identify nine characteristics that can help small and medium-sized companies gain a competitive edge when they incorporate the SDGs into their strategies.

There are many questions about how businesses and the SDGs are connected, such as whether companies are focusing on specific SDGs, how they report on their SDG efforts, whether it's good for business, and what people think about it (Rodríguez-Ariza, 2020; Van Tulder, 2018; Diaz-Sarachaga, 2018; Pedersen, 2021). These questions reflect the ongoing discussion about how companies can make a positive impact on society and the environment by aligning with the SDGs.

2.2 The Triple Bottom Line concept

Elkington's pioneering work in 1994 led to the development of The Triple Bottom Line (TBL), which aimed to introduce a new conceptual framework and specialized sustainability terminology into the business world. Since its inception, the TBL has served as a valuable tool for evaluating sustainability policies and reporting, encompassing environmental responsibility, social equity, and economic prosperity. Its appeal lies in its ability to simplify the assessment of how corporate activities impact society (McCartney & Rouse, 2004).

In a more recent reflection, Elkington (2018) revisited the TBL, he emphasized that even well-established concepts like the TBL require periodic revaluation, particularly after

a quarter-century of practical application. Elkington argued that measuring sustainability success solely through profit is insufficient. Instead, he advocated for a comprehensive evaluation that considers both the planet's ecological health and the well-being of billions of people. Elkington noted that some sustainability goals received more attention than others and called for collective action to address pressing threats such as climate change, water scarcity, and biodiversity loss.

Elkington advocates to prioritize sustainability in all facets of life, be it as conscientious citizens, innovative entrepreneurs, diligent scientists, or enlightened policymakers. Given the enduring relevance of the TBL concept, evidenced by its continued use in research like the work of Costanza et al. (2016), the concept remains highly relevant and will be used in our research to aggregate SDG in pillar groups. Therefore, our proposed alignment of the Sustainable Development Goals (SDGs) with the TBL, as outlined in this study, is supported by existing literature and forms an integral part of our research methodology.

2.3 Corporate Reports

The evolution of corporate reporting has been marked by shifts in reporting standards, regulatory frameworks, and stakeholder expectations. The emergence of Generally Accepted Accounting Principles (GAAP) and International Financial Reporting Standards (IFRS) has played a pivotal role in standardizing financial reporting practices across countries (Gray et al., 1995). However, corporate reporting has evolved beyond financial metrics to encompass non-financial aspects, including environmental, social, and governance (ESG) factors (Deegan, 2002). This expansion has been driven by the recognition that financial performance alone does not provide a comprehensive picture of a company's value and impact (Adams et al., 2016).

Corporate reporting typically includes various components, each serving a distinct purpose in conveying information to stakeholders. Financial statements, such as balance sheets, income statements, and cash flow statements, form the core of traditional corporate reporting, offering insights into a company's financial performance (Kieso et al., 2021). Non-financial reporting elements, such as sustainability reports, environmental disclosures, and integrated reports, provide a broader view of a company's environmental and social impacts (Eccles & Krzus, 2010; GRI, 2016).

The rise of the stakeholder audience and their expectations for greater transparency and accountability has necessitated a rethinking of corporate reporting, as emphasised by Adams and McNicholas (2007), Busco et al. (2013), and Hopwood (2009). Non-financial reporting and sustainability have been critical in this development, according to Campra et al. (2020), Perrini (2006), La Torre et al. (2018), and Uyar (2016).

The external business environment has undergone significant changes, and traditional corporate financial reporting is unable to keep up with these changes due to its drawbacks, including a lack of non-financial information, short-termism, incoherence, and complexity. As a result, the need for better corporate reporting has emerged, as highlighted by Busco et al. (2013) and Lombardi and Secundo (2021), to communicate with stakeholders and pursue accountability commitments.

2.4 Corporate Reports and SDGs

Corporate reporting's relevance to sustainable development lies in its capacity to facilitate informed decision-making, promote accountability, and advance responsible business practices (Hahn et al., 2015). By reporting on sustainability metrics and their alignment with the SDGs, companies can contribute to the global agenda of addressing pressing societal and environmental challenges (Dumay et al., 2019). Furthermore, corporate reporting is integral to stakeholders' assessment of a company's commitment to sustainability, which can influence investment decisions and reputational standing (KPMG, 2017).

Although corporate reporting is a critical means of communication with stakeholders (Blomme, 2017) and informing internal decision-making processes (Carraher & Auken, 2013), there have been notable financial reporting scandals and a history of accountability deficits, along with the ongoing environmental crisis. To address these issues, Integrated Reporting (IR) has emerged as a solution (White, 2005).

The financial sector occupies a unique position in corporate reporting due to its role as a provider of financial services, investor, and regulator. Banks and financial institutions are expected to adhere to stringent reporting requirements to ensure the stability and integrity of financial markets (Linsley & Shrives, 2006).

Gray and Milne outlined a perspective on the ongoing dialogue, highlighting that sustainability reporting, specifically in the context of GRI reporting, predominantly emerges as a voluntary initiative by companies and emphasized the coexistence of a conflict between the financial interests of these companies and the pursuit of sustainable development (Gray & Milne, 2002)

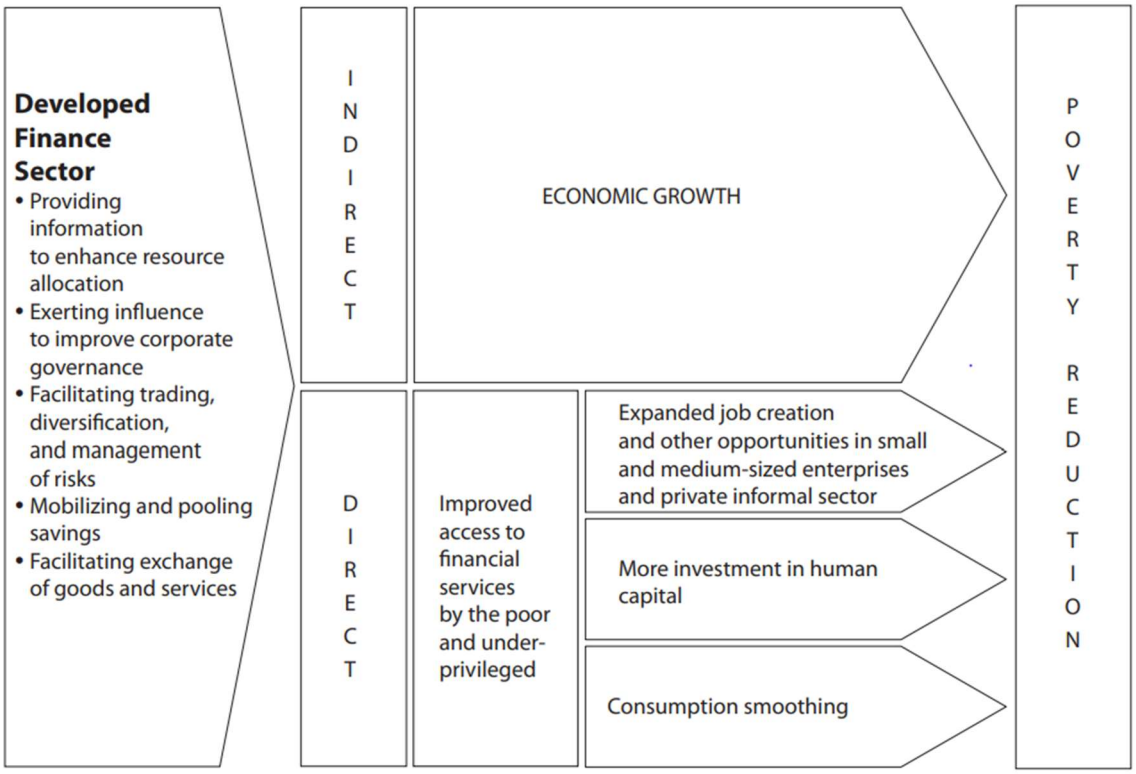
2.5 Financial Industry

Levine (2004), summarize and identify the main keys function of financial systems, as an instrumental in economic development by aggregating savings from diverse individuals for investment, reducing transaction costs and information gaps. Promote savings, optimize resource allocation for large projects, and drive growth while fostering innovation. Also, Financial intermediaries specialize to lower information acquisition costs for individual savers, enhancing resource allocation and speeding up growth and identifying optimal technologies and entrepreneurs. Robust financial markets encourage research on firms, leading to informed decision-making and profitable trading, contribute to an effective corporate governance, through methods as creditor monitoring. Financial systems diversify risk, reducing uncertainty for innovative projects and encouraging investment in growth activities. They support intertemporal risk sharing, liquidity, and investment in less liquid assets, promoting economic growth by reducing transaction and information costs, they facilitate trade, specialization, innovation, and growth. This positive cycle reinforces both the financial sector and overall economic growth, helping the private and public sectors and households invest wisely and manage consumption.

Using cross-countries analyses (e.g., Dollar and Kraay 2002, Ravallion 2004, Ravallion and Chen 1997) show that economic growth and poverty reduction are indeed strongly and positively correlated, other empirical studies examine direct relationship between financial sector development and poverty and inequality reduction (e.g., Beck, Demirgüç-Kunt and Levine 2004; Clarke,Xu and Zou 2003; Honohan 2004a; Li, Squire, and Zou 1998).

So as shown on (figure3) the financial sector and his development have a crucial role to economic growth and to poverty reduction.

Figure 4: Financial Sector Development and Poverty Reduction



Source: Zhuang et al. (2009)

2.6 Financial Industry and SDG involvement

In the world of finance, there is a paradoxical relationship with sustainability, both contributions and detractions from the pursuit of sustainable development and the realization of the Sustainable Development Goals (SDGs). Financial institutions have increase socially responsible investment, green bonds, micro-finance, that are linked with SDGs 11, SDG 13, and SDG 1, thus the same financial could finance the causes of the sustainability problems (Wiek and Weber 2014), not only on climate as financing a coal power plant but might negatively contribute to childhood obesity and hence work against SDG 3(Moodie et al. 2013; Monteiro et al. 2013).

This ambivalent relationship with sustainability development is link to the “business case of sustainability” approach (Schaltegger and Burritt 2015), which only issues that has a direct and immediate impact on business risk or opportunities are considerable valuables.

Olaf Weber argue that banks act more reactive then proactive on sustainable practices but maybe trough the sustainability of banking and finance (Weber 2014; Weber and Feltmate 2016), financial institution could analyse the 17 SDGs and find a better way to lend, invest and mange assets. (See figure 4)

Figure 5: Financial Sector and the SDGs Interconnections and Future Directions

SDG	Products and Services
1 No poverty	Private international development finance through impact investing
2 Zero hunger	Microfinance for smallholder farmers
3 Good health and well-being	Health-care investments
4 Quality education	Philanthropic donations to schools
5 Gender equality	Microfinance and lending to women and female entrepreneurs
6 Clean water and sanitation	Socially responsible mutual funds investing in water
7 Affordable and clean energy	Renewable energy investment
8 Decent work and economic growth	General investments into the real economy
9 Industry innovation and infrastructure	Project finance and commercial lending integrating social and environmental criteria for lending decisions
10 Reduced inequalities	Fair payment of financial sector employees
11 Sustainable cities and communities	Mortgage lending
12 Responsible consumption and production	Socially responsible investing
13 Climate action	Climate finance
14 Life below water	Financing ecological services
15 Life on land	Financing ecological services
16 Peace, justice and strong institutions	Lending to public institutions

Source:Weber (2018)

Past research suggests that those banks that adopted sustainability principles have significant better performance on equity returns and assets as compared to those which did not implement sustainability practices (Shen, Wu, Chen, & Fang, 2016). Sustainability practices implementation increased revenues, whereas having negative correlation with NPLs (Non-Performing Loans) (Wu & Shen, 2013). Incorporation of sustainability practices in everyday operations of banks strengthening reputation and improving overall performance of banks (Aracil Fernández & Forcadell, 2017). Whereas performance in terms of

sustainability in banking sector is relatively low than other sectors (Weber, Diaz, & Schwegler, 2014).

Given this context and the profound significance of the financial sector and its intricate connection with the SDGs, the first research question of this study emerges: "Are SDGs included in corporate reports within the banking sector, and how has this inclusion evolved over time?"

The ownership of company could impact the acts of the companies, especially when the state is the owner, state intervention could help overcome market failures and develop strategic sectors promoting economic development (Gerschenkron, 1962; Stiglitz, 1993). Specially in specific times and situations as 2008 Global financial crises, Brei and Schclarek (2013) find that government-owned banks increase their lending during crisis periods compared to normal times as government-owned banks could play crucial role in stabilizing credit flows during crises.

State-owned commercial banks can be significantly different from privately owned banks, as they pursue a different lending agenda in response to the government's needs. Gonzalez-Garcia et al. (2013).

In the context of exploring the ownership structure of companies and its influence on decision-making and stakeholder interactions, the second research question of this study arises: "Is there a disparity in the manner in which state-owned banks (SOB) reference SDGs in their corporate reports compared to private-owned banks (POB)?" Considering this inquiry, we aim to address the corresponding two hypothesis:

Hypothesis 1*: State-owned banks provide more SDG references in corporate reports than private-owned banks.*

Hypothesis 2*: There is a difference in the SDGs references linked to the Economic Pillar between state-owned banks and private banks.*

Hypothesis 3*: There is a difference in the SDGs references linked to the Environment Pillar between state-owned banks and private banks.*

Hypothesis 4*: There is a difference in the SDGs references linked to the Social Pillar between state-owned banks and private banks.*

3. Methodology

3.1 Sample Selection and Description

The sample of this study is the 100 largest banks of the world, whose list was taken from S&P (The world's 100 largest banks, 2022; S&P Global Market Intelligence, 2022). The S&P list contains banks from 24 different countries, 41 from Asia and Pacific, 37 from Europe, 21 from Americas and 1 from Middle East. Present also 9 different accounting principle, IFRS which represent 56 banks, is the most used on this list (Table 1).

Table 1:The world's 100 largest bank per HQ country and Accounting Pricinple

Number of Banks per Country				Number of Banks per Accounting Principle	
China	**19**	Sweden	**3**	IFRS	**56**
U.S.	**12**	Switzerland	**3**	U.S. GAAP	**14**
Japan	**8**	Spain	**3**	PRC GAAP	**8**
Canada	**6**	Italy	**2**	Japanese GAAP	**7**
France	**6**	Austria	**1**	Korean IFRS	**6**
U.K	**6**	Belgium	**1**	Australian IFRS	**4**
South Korea	**6**	Denmark	**1**	Singapore IFRS	**3**
Germany	**5**	Finland	**1**	India GAAP	**1**
Australia	**4**	India	**1**	Swiss GAAP	**1**
Brazil	**3**	Norway	**1**		
Netherlands	**3**	Qatar	**1**		
Singapore	**3**	Russia	**1**		

From the 2022 The World Larges Banks list, we tried to get all annual reports, as it's a mandatory document. In the case of banks that have already published an integrated reports, we use the integrated reports. Thus, in the beginning, were expected to get the reports of the 100 largest banks in 8 years (from 2015 to 2022), which corresponds to obtaining 800 (100 × 8) reports to perform the textual analysis.

We visited each bank webpage to find the annual report, and made the donwload of 8 reports for each bank analyzed in the study, after downloading the 800 reports, it turned out that 2 reports from 2 different banks were encrypted, therefore we could not use them, and these 2 banks were not considered for analysis. We also excluded 16 reports from 8 banks that we could not get all 8 years of reports, and then all reports from these banks were excluded for this study as well. The final sample consists of 90 of the largest banks based on Assets in USD, corresponding to 720 reports (8 reports for each bank from 2015 to 2022) (see Table 2).

Table 2: Reports excluded from the study

	Banks	Reports
Initial Sample	100	800
Reports encrypted, then not able to perform the Python script.	-2	-16
Reports not found on the website or with corrupted files.	-8	-64
Final Sample	**90**	**720**

3.2 Procedure for measuring SDGs

We established a database comprising 90 banks from the 100 largest banks of the world, sourcing our data from S&P (The world's 100 largest banks, 2022; S&P Global Market Intelligence, 2022). Within this database, we included key variables such as company names, countries of operation, accounting principles adhered to, and total assets from the S&P list, and to answer the research questions, we augmented it with several additional variables of interest. In this way, the database is made up of variables that include characteristics that define the banks themselves, as well as variables related to the Sustainable Development Goals (SDGs).

Among the bank-characterizing variables, we examined their public or private status by scrutinizing ownership of shares as reported in their financial disclosures. Banks were categorized as State-owned Banks (SOB) if the public sector held more than 50% of the bank's shares (Micco et al., (2007). Conversely, banks were classified as Private Owned Banks (POB) if the public sector's ownership did not exceed the 50% threshold.

For the SDGs variables were used textual analysis from the annual reports and integrated reports. Textual analysis in social science has been increasing over the past two decades Schwartz and Ungar (2015), Gentzkow et al. (2019), Berger et al. (2020), Loughran and McDonald (2020), and Colon-Ruiz and Segura-Bedmar (2020), as using NLP makes the large quantity of textual less labour intense Jones and Shoemaker (1994) and Cole and Jones (2005).

The bank reports were analysed using text analysis with the Natural Language Process (NLP) Python library nltk. This analysis yielded 18 variables related to SDGs searching for specific keywords to identify the use of SDGs in the bank reports.

To obtain the 18 variables, firstly, we used pyPDF2, a Python library that transforms PDFs files into text. We saved all the reports as “txt” files, then before performing the textual analysis, we performed a pre-processing method to the texts in order to enhance the comparability of the texts. This included eliminating all line breaks and tabulators, all Unicode-wide characters and all blanks that occur several times in sequence, transforming all words into minuscule and dividing the text into single words (tokens). Next, we eliminated words that consist of only one character and stop words, as provided by McDonald (2017).

For the textual analysis, we used the methodology developed by Hoberg and Maksimovic (2015) and applied by various authors (Hummel et al., 2020; Hummel & Rötzel, 2019; Hummel & Szekely, 2021). To obtain a general variable indicating whether the SDGs were mentioned in the reports, a search for specific terms, such as (['sdg'], ['sdgs'], ['sdg#]', ['global', 'goal'], ['sustainable', 'development', 'goal']) within a 5 words window to identify if was mentioned or not SDGs on the reports. This variable was designated as "SDG" and is a binary variable, assuming the value 1 if at least one of the indicated words or group of words were found and 0 otherwise. This process was repeated by all 17 SDGs, but using different words for each SDG (see Table 3 to analyse the specific words considered in each SDG). As a result, 17 binary variables were obtained, labelled as "SDGj," where j = 1, ..., 17, representing the number of the sustainability goal under analysis.

Table 3 :Terms searched for each SDG in the textual analysis

Goal	Keywords used on the query
SDG1	['poverty'], ['low', 'income'], ['poor', 'customer'], ['poor', 'people'], ['poor', 'person']
SDG2	['hunger'], ['hungry'], ['famine'], ['malnutrition'], ['undernourish'], ['undernourishment'], ['food', 'security'], ['affordable', 'food'], ['food', 'safety'], ['food', 'price'], ['healthcare'], ['health'], ['mortality', 'rate']
SDG3	['education'], ['literacy', 'skill'], ['skill', 'workforce'], ['gender', 'equality'], ['gender', 'discrimination'], ['gender', 'parity'], ['women'], ['woman'], ['gender', 'pay'], ['equal', 'pay'], ['equal', 'remuneration'], ['workplace', 'harassment'], ['female', 'leader'], ['female', 'manager'], ['equal', 'opportunity']
SDG4	['education'], ['literacy', 'skill'], ['skill', 'workforce']
SDG5	['gender', 'equality'], ['gender', 'discrimination'], ['gender', 'parity'], ['women'], ['woman'], ['gender', 'pay'], ['equal', 'pay'], ['equal', 'remuneration'], ['workplace', 'harassment'], ['female', 'leader'], ['female', 'manager'], ['equal', 'opportunity']
SDG6	['clean', 'water'], ['water', 'scarcity'], ['sanitation'],['affordable', 'drink', 'water'], ['affordable', 'drinking', 'water'], ['basic', 'drink', 'water'], ['basic', 'drinking', 'water'], ['water', 'efficiency'], ['water', 'access'], ['water', 'relate', 'ecosystem'], ['water', 'relate', 'biodiversity'], ['water', 'ecosystem'], ['water', 'biodiversity'], ['fresh', 'water'], ['water', 'pollution'], ['water', 'withdrawal']
SDG7	['clean', 'energy'], ['solar', 'power'], ['wind', 'power'], ['thermal', 'power'], ['renewable', 'energy'], ['electricity', 'access'], ['electricity', 'availability'], ['electricity', 'reliability'], ['energy', 'efficiency']
SDG8	['unemployment'], ['unemployed'], ['forced', 'labor'], ['forced', 'labour'], ['compulsory labor'], ['compulsory labour'], ['child', 'labor'], ['child', 'labour'], ['slavery'], ['decent', 'work'], ['job', 'creation'], ['labor','standard'], ['labour','standard'], ['employment'], ['economic', 'inclusion'],

	['skilled', 'workforce']
SDG9	['innovation'], ['technological', 'progress'], ['research'], ['entrepreneurship'], ['infrastructure'], ['development'], ['technological', 'legacy'], ['environmental', 'investment'], ['sustainable', 'investment'], ['socially', 'responsible', 'investment']
SDG10	['income', 'inequality'], ['racial', 'discrimination'], ['inclusion'], ['religious', 'discrimination'], ['sexual', 'discrimination'], ['global', 'wealth'], ['economic', 'inequality'], ['diversity'], ['equal', 'opportunity'], ['economic', 'inclusion'], ['equal', 'remuneration']
SDG11	['sustainable', 'city'], ['sustainable', 'community'], ['slum'], ['healthy', 'city'], ['healthy', 'community'], ['affordable', 'housing'], ['sustainable', 'building']
SDG12	['recycle'], ['sustainable', 'consumption'], ['sustainable', 'consume'], ['responsible', 'consumption'], ['responsible', 'consume'], ['resource', 'efficiency'], ['resource', 'efficient'], ['food', 'waste'], ['sustainable sourcing'], ['resource', 'efficiency'], ['material', 'recycling'], ['product', 'label'], ['product', 'labelling']
SDG13	['climate', 'change'], ['greenhouse', 'gas'], ['co2'], ['carbon', 'emission'], ['global', 'warm'], ['global', 'warming'], ['low', 'carbon'], ['sustainable', 'energy'], ['renewable', 'energy'], ['ghg'], ['energy', 'efficiency']
SDG14	['marine', 'biodiversity'], ['coastal', 'biodiversity'], ['fish', 'stock'], ['ocean'], ['acidification'], ['marine', 'pollution'], ['marine', 'ecosystem'], ['coastal', 'ecosystem'], ['coastal', 'habitat'], ['spill'], ['water', 'discharge']
SDG15	['deforestation'], ['natural', 'habitat'], ['species'], ['biodiversity'], ['biological', 'diversity'], ['ecosystem'], ['aichi', 'target'], ['genetic', 'diversity'], ['forest', 'degradation'], ['land', 'remediation'], ['fiber', 'sourcing'], ['natural', 'habit']
SDG16	['peace'], ['justice'], ['violence'], ['crime'], ['human', 'right'], ['security'], ['torture'], ['corruption'], ['bribery'], ['law'], ['corruption'], ['bribery']
SDG17	['development', 'assistance'], ['north', 'south', 'cooperation'], ['south', 'south', 'cooperation'], ['global', 'partnership']

Source: Hummel & Szekely (2021)

3.3 Data Analysis Procedure

The database was constructed using Python version 3.11 (Python Software Foundation, 2021), and the data were exported to Microsoft Excel. Subsequently, a new, more general variable, termed "SDG disclosure" (DIS) was created to measure whether the various SDGs have been referenced in the reports. This variable was derived by calculating a ratio of the number of SDGs mentioned by each bank in each year, as follows:

$$DIS_{it} = \frac{\sum_{j=1}^{17} SDGj_{it}}{17} \qquad (1)$$

In equality (1), j = 1, ..., 17 represents the SDG number, i = 1, ..., 90 represents the bank, and t = 2015, ..., 2022 represents the year. The DIS_{it} variable takes values in the interval [0, 1] as it is a proportion. The value 0 means that no SDG was referenced in the reports, and the value 1 means that all SDGs were referenced in the reports. The closer the DIS variable values are to 1, the more SDGs are referenced in the reports.

Three new variables were also created to measure whether the SDGs of the three pillars of sustainability (Environment - ENV, Social - SOC, and Economic - ECO) are mentioned in the reports. To obtain these variables, the grouping proposed by Constanza et al. (2016) was used, as well as more recently in the study by Martins et al. (2023). Thus, the three variables were defined as follows:

$$ENV_{it} = \frac{SDG2_{it} + SDG6_{it} + SDG13_{it} + SDG14_{it} + SDG15_{it}}{5} \quad (2)$$

$$SOC_{it} = \frac{SDG2_{it} + SDG3_{it} + SDG4_{it} + SDG5_{it} + SDG6_{it} + SDG7_{it} + SDG8_{it} + SDG15_{it}}{8} \quad (3)$$

$$ECO_{it} = \frac{SDG3_{it} + SDG7_{it} + SDG8_{it} + SDG11_{it} + SDG14_{it}}{5} \quad (4)$$

In equalities (2), (3) and (4), i = 1, …, 90 represents the bank, and t = 2015, … 2022 represents the year. ENV_{it}, SOC_{it} and ECO_{it} are variables that take values in the interval [0, 1] as they represent proportions. The value 0 means that no SDG liked with the respective pillar was referenced in the reports, and the value 1 means that all SDGs liked with the respective pillar were referenced in the reports. The closer the values of ENV_{it}, SOC_{it} or ECO_{it} are to 1, the more SDGs linked with the respective pillar are referenced in the reports, in other words, more Environmental, Social or Economic topic was addressed on the reports

To address the first research question, our analysis commenced with an examination of the proportion of banks that mention the keywords for SDG in their reports through the years using a line chart. Subsequently, we scrutinized the line chart of the DIS variable to assess the evolution of terms related not only to the singular word "SDG" but also to all SDGs collectively. We create a table containing the proportion of mention of each SDG in the reports per year to discern their temporal evolution, To assess and understand we 8 SDGs which had a more variation and plot their char to evaluate trend over years for those goals. Additionally, to examine the behaviour of SDGs grouped by pillars, we created annual line graphs for each pillar.

In pursuit of understanding the second research question, we replicated the same graphs for the variables p_SDG, DIS, ENV, ECO, and SOC. However, we introduced two series: one for State-Owned Banks (SOB) and another for Private Owned Banks (POB). Subsequently, we conducted statistical tests using SPSS between the two series, *t*-test for indepent samples to check if the differences noted on the charts were statistically significant and pearson correlation to examine if the trend over the years was statistically significant.

4. Results and discussion

4.1. Sample Characterization

The final sample contains 90 banks, from 23 different countries, 38 from Asia and Pacific, 33 from Europe, 19 from Americas. Present also 9 different accounting principles, IFRS which represent 50 banks, which is the most used on this list (Table 5).

Table 4:Final sample per HQ country and Accounting principles

Number of Banks per Country				Number of Banks per Accounting Principle	
China	**17**	Singapore	**3**	IFRS	**50**
U.S.	**10**	Sweden	**3**	U.S. GAAP	**12**
Japan	**7**	Switzerland	**3**	PRC GAAP	**7**
Canada	**6**	Spain	**2**	Japanese GAAP	**6**
U.K	**6**	Italy	**2**	Korean IFRS	**6**
South Korea	**6**	Austria	**1**	Australian IFRS	**4**
France	**5**	Belgium	**1**	Singapore IFRS	**3**
Germany	**4**	Denmark	**1**	India GAAP	**1**
Australia	**4**	Finland	**1**	Swiss GAAP	**1**
Brazil	**3**	India	**1**		
Netherlands	**3**	Norway	**1**		
Singapore	**3**	Russia	**1**		

Of the 90 banks under study, we have 13 State-Owned Banks (SOBs), representing 14.4% of the sample, and 77 private banks, representing 85.6% of the sample (see Table 6).

Table 5: Final sample per ownership

	Number of Banks	Number of reports	%
Private	77	616	85.6
Public	13	104	14.4

4.2. SDGs evolution

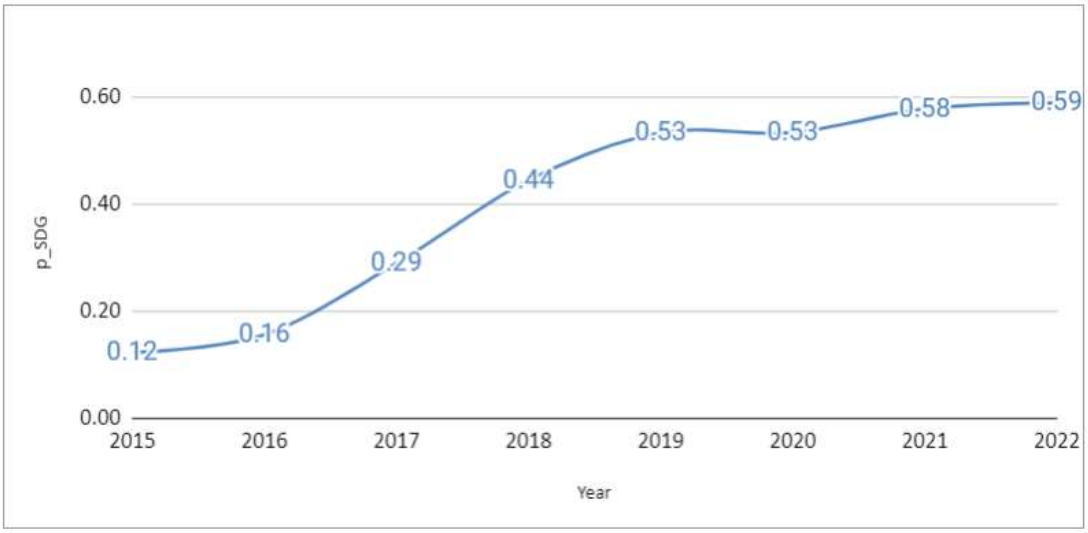
To analyze the binary variable SDG, proportions were obtained for each of the years as follows:

$$p\_SDG_t = \frac{\sum_{i=1}^{90} SDG_t}{90} \qquad (5)$$

In equality (5), i = 1, ..., 90 represents the bank, and t = 2015, ..., 2022 represents the year. Note that $0 \leq p\_SDG_t \leq 1$.

We can see in Figure 5 the evolution of the proportions (*p_SDG)* over the years, which represents the proportion of banks, in each year, that mention the SDG terms in their annual reports or integrated reports. This allows us to observe an increase in this variable over the years, indicating that banks are increasingly adhering to the SDGs.

Figure 7:Evolution of proportional mentioning of SDG terms



Continuing to address the first research question, which aims to understand the evolution of the SDGs in annual reports and integrated reports, we also analysed each SDG individually. To analyze the 17 binary variables *SDGj* (j = 1, … 17), proportions were obtained for each of the years as follows:

$$p\_SDGj_t = \frac{\sum_{i=1}^{90} SDGj_t}{90} \qquad (6)$$

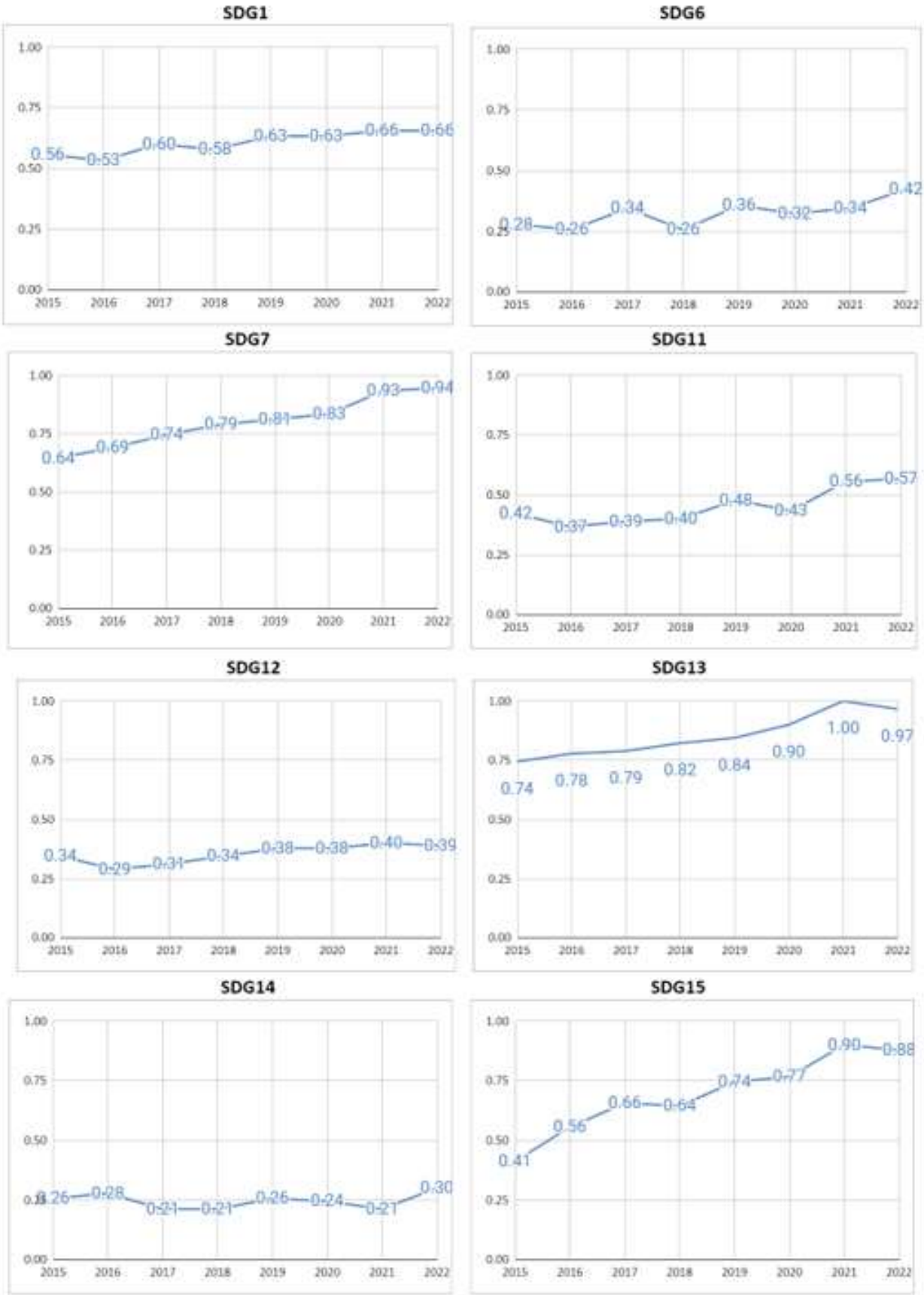
In equality (6),j = 1, … 17 represents the SDG number, i = 1, ..., 90 represents the bank, and t = 2015, ..., 2022 represents the year. Note that $0 \leq p\_SDGj_t \leq 1$.

Table 5 displays the evolution of the proportions of each SDG over the years, and it can be observed that 9 of the SDGs are characterized by a notably low, if not negligible, growth profile (SDG2, SDG3, SDG4, SDG5, SDG8, SDG9, SDG10, SDG16, and SDG17). These results show that the SDGs mentioned in the period under consideration have been increasingly referenced in the bank reports.

Table 6: Propotion of each SDG per year

	2015	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
p_SDG1	0.56	0.53	0.60	0.58	0.63	0.63	0.66	0.66
p_SDG2	0.97	0.99	0.99	0.97	0.99	0.98	0.98	0.98
p_SDG3	1.00	0.97	0.99	0.97	0.98	0.96	0.97	0.96
p_SDG4	0.96	0.92	0.94	0.93	0.94	0.91	0.93	0.91
p_SDG5	0.78	0.76	0.81	0.89	0.92	0.87	0.83	0.84
p_SDG6	0.28	0.26	0.34	0.26	0.36	0.32	0.34	0.42
p_SDG7	0.64	0.69	0.74	0.79	0.81	0.83	0.93	0.94
p_SDG8	0.97	0.97	0.98	0.97	0.98	0.98	0.98	0.98
p_SDG9	1.00	1.00	1.00	0.99	0.99	0.99	1.00	0.98
p_SDG10	0.93	0.93	0.94	0.97	0.96	0.97	0.99	0.99
p_SDG11	0.42	0.37	0.39	0.40	0.48	0.43	0.56	0.57
p_SDG12	0.34	0.29	0.31	0.34	0.38	0.38	0.40	0.39
p_SDG13	0.74	0.78	0.79	0.82	0.84	0.90	1.00	0.97
p_SDG14	0.26	0.28	0.21	0.21	0.26	0.24	0.21	0.30
p_SDG15	0.41	0.56	0.66	0.64	0.74	0.77	0.90	0.88
p_SDG16	1.00	1.00	1.00	0.99	0.99	0.99	0.99	0.99
p_SDG17	0.18	0.12	0.16	0.16	0.16	0.20	0.19	0.19

Figure 8:SDGs with greater variation trough the years

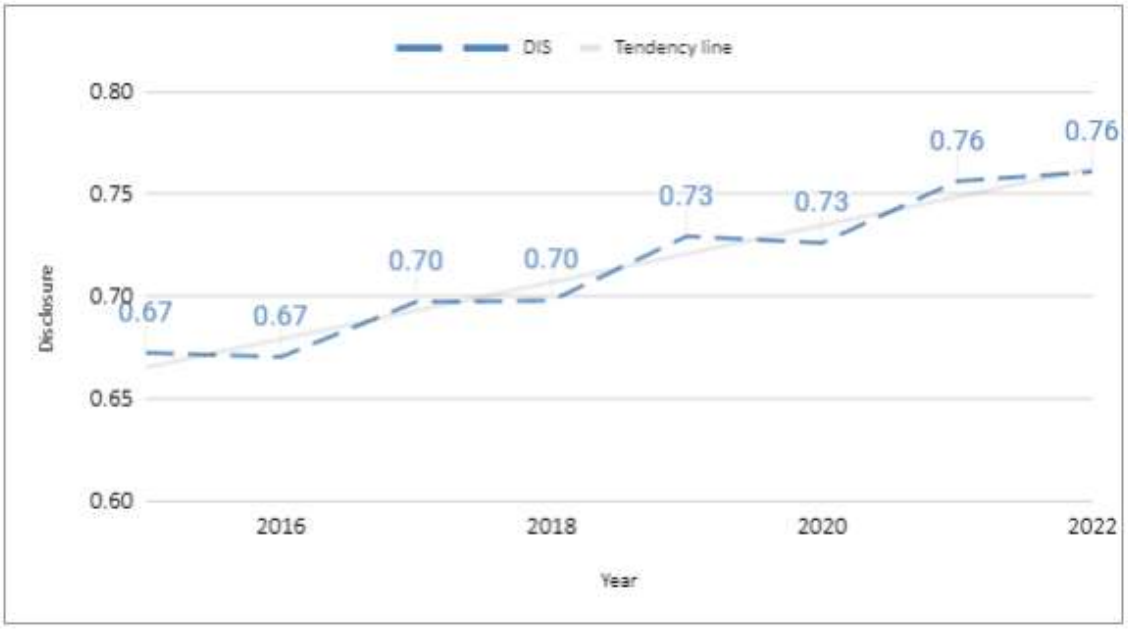


Looking in the figure 6 we notice from the 8 selected SDGs that had more increasing

over the time period, the SDG7, SDG13,SDG15 has a steep growth over the years.In 2015 just 41% of the banks mentioned terms liked to SDG15, but in 2022 last year of our analysis the value was 88%.

If we look at the other variable created, DIS, which considers the 17 binary variables together, we also observe the growth of these variables (Figure 6). However, we already noticed that the terms contained within the 17 SDGs were being mentioned more frequently than the specific term‘ ['sdg']‘ ['sdgs']‘ ['sdg#']‘ ['gloal‘, 'goal']‘ ['sustainable‘, 'development‘, 'goal']. In other words, we observe that the topic of SDGs is increasingly being mentioned in the banks' reports.

Figure 10:Evolution of disclosure of all 17 SDGs

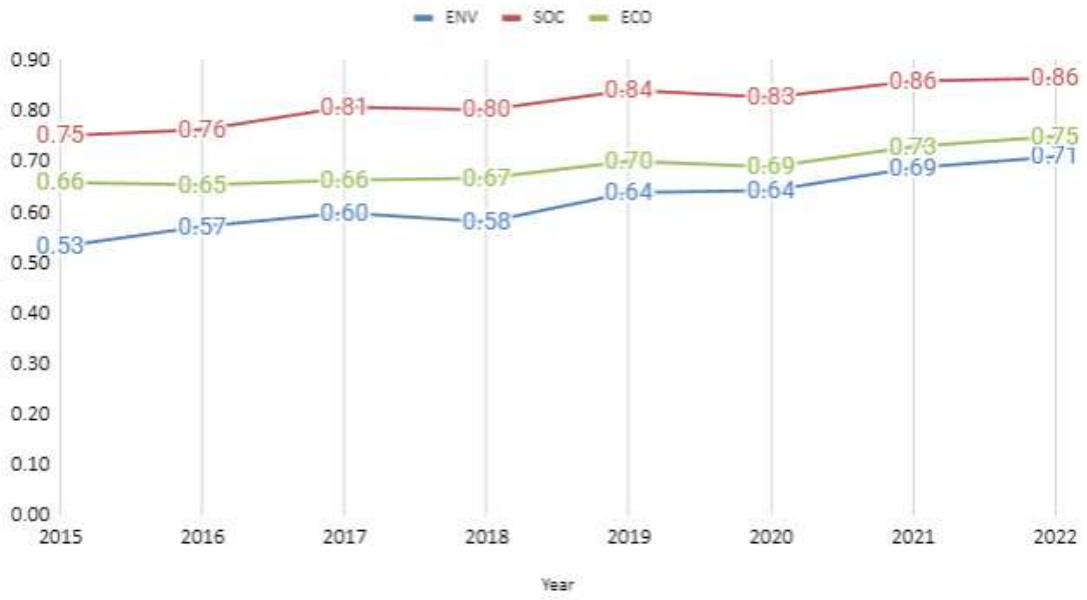


By applying the Pearson correlation, it can be observed that there is sufficient statistical evidence to assert that over the years, the values of the Disclosure variable have been increasing ($r = 0.23$, $p < 0.01$), indicating that the inclusion of SDGs in the banks' reports has been significantly increasing over time, which addresses the first research question and corroborates with the results shown by PricewaterhouseCoopers' research, as in 2018, 68% of the banks mentioned SDGs in their reports, whereas in the same study conducted in 2019, 74% of the banks mentioned SDGs in their reports (PWC, 2018, 2019).

4.3. SDGs Evolution by pillar

Extending the scope of our analysis, we embark on an examination of the SDGs as collective entities, guided by the Triple Bottom Line (TBL) theory and leveraging the variables ENV, ECO, and SOC. Our inquiry unveils a striking consistency in the growth pattern across all three groups, aligning seamlessly with the trends observed for individual SDGs and the SDGs grouped (Figure 11).

Figure 11:Evolution per year of SDGs grouped by TBL pillars



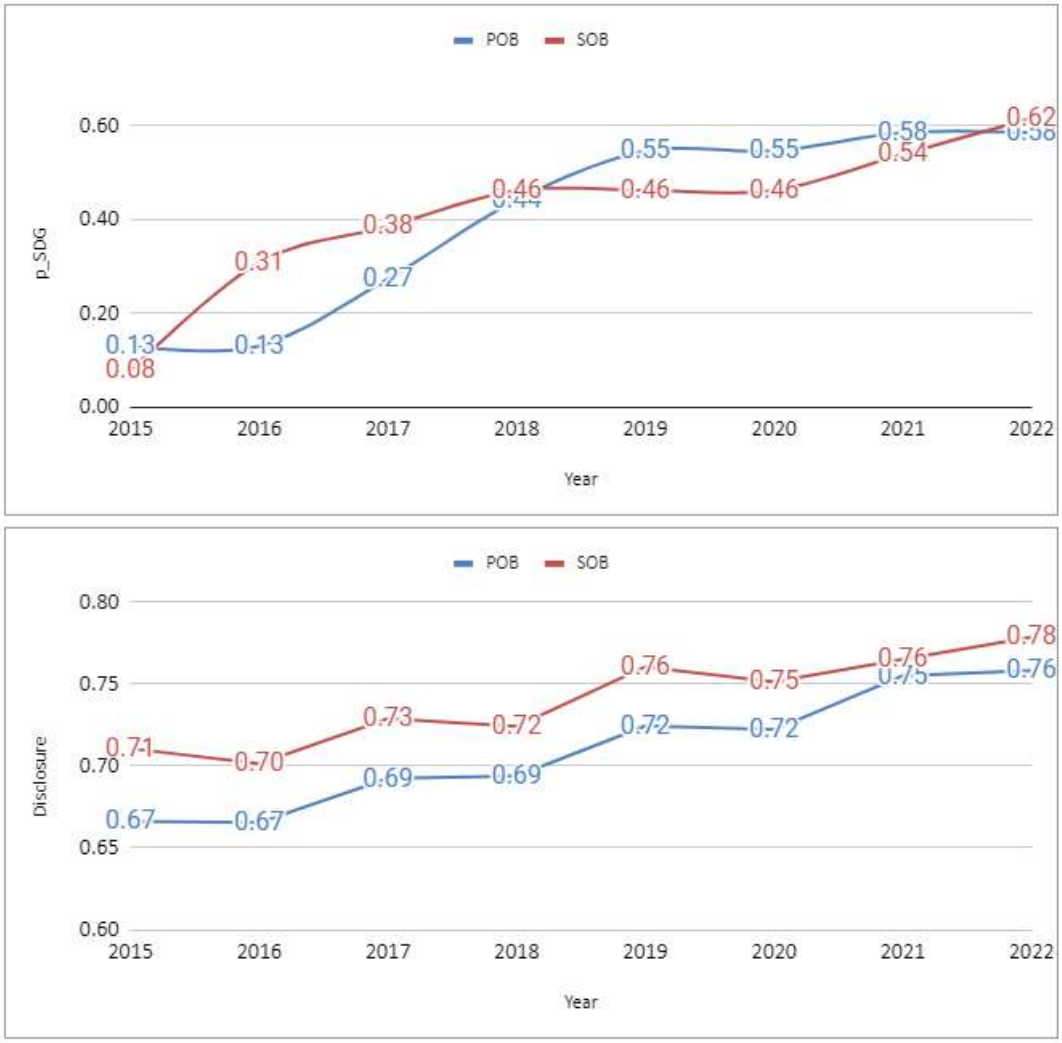
Nevertheless, it is imperative to underscore that the social pillar assumes a more prominent role. This observation hints at the proclivity of banks to more frequently reference SDGs associated with the social pillar in comparison to those linked with the other two pillars. In alignment with PwC's 2019 report, which indicates that SDG 8 and SDG 4 (PWC, 2019) are among the most frequently cited by banks, and both linked with the Social pillar.The Environmental pillar apparently has less importance over the tree pillar as appears since the beginning with less proportion of references in the reports

By applying the Pearson correlation, it can be observed that there is sufficient statistical evidence to assert that over the years, the values of the variables corresponding to the three pillars of sustainability have been increasing (ENV: $r = 0.26$, $p < 0.01$; SOC: $r = 0.23$, $p < 0.01$; ECO: $r = 0.17$, $p < 0.01$), indicating that the inclusion of SDGs from the Environmental, Social, and Economic pillars in the banks' reports has been significantly increasing over time.

4.4 Difference between State-Owned Banks and private banks

Next, we analyze the SDG and DiS variables, similar to what was done in Section 4.2, to understand if there is any difference between State-Owned Banks (SOB) and private banks (POB). When observing Figure 9, we notice a difference in the DIS variable in all years. However, regarding the SDG variable, it can be observed that in the years 2016, 2017, and 2018, state-owned banks were the ones mentioning the terms related to the SDG variable the most, and from 2019 to 2021, the trend was reversed, with private banks mentioning the corresponding terms to the SDG variable more frequently (Figure 9).

Figure 13: Evolution of proportion of mentinoing SDG term and disclosure of all SDGs by bank ownership



To test the hypotheses, we applied the t-test for comparing means of independent samples. Through the examination of Table 7, statistically significant differences can be observed for the variable Disclose ($t = 2.07$, $p < 0.05$), with public banks mentioning more SDGs in their reports than private banks. This empirical finding lends support to Hypothesis 1.

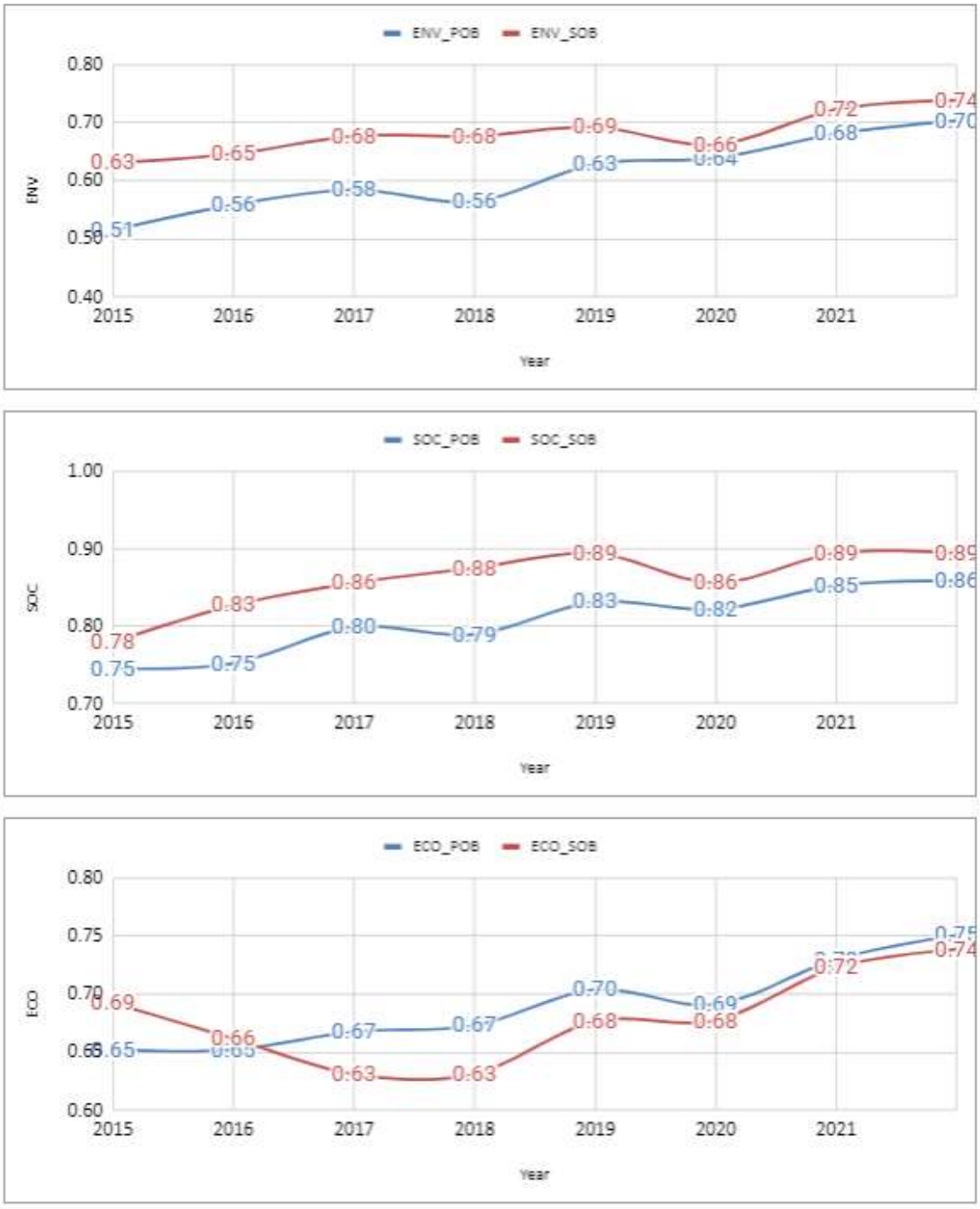
Table 7: Result of the comparison of disclosure between state-owned banks and private banks

	SOB		POB		
	M	*SD*	*M*	*SD*	*t*-test
Disclosure	0.74	0.11	0.71	0.14	2.07*

Note: *p < 0.05

Delving further into our analyses to ascertain potential distinctions between State-Owned Banks (SOB) and private banks (POB) in referencing SDGs corresponding to each pillar, our findings, as depicted in Figure 13, reveal a consistent growth trend over time across all pillars for both groups. Specifically, we observe that the social and environmental pillars exhibit greater prominence in SOB, whereas the economic pillar assumes a more notable position within private banks after 2017, but to understand if this difference is statistically significant, we perform an independent samples *t*-test.

Figure 14: Evolution per year of Pillars by bank ownership



By observing Table 8 statistically significant differences can be discerned for the ENV ($t = 3.21$, $p < 0.01$) and SOC ($t = 3.98$, $p < 0.01$) pillars. In these instances, public banks mention more SDGs in their reports than private banks, empirically supporting Hypotheses 2 and 3.

Table 8:Result of the comparison of pillar between public and private banks

	SOB		POB		
	M	*SD*	*M*	*SD*	*t*-test
ENV	0.68	0.18	0.61	0.21	3.21**
SOC	0.86	0.12	0.81	0.17	3.98**
ECO	0.68	0.16	0.69	0.18	-0.58

Note: $^{**}p < 0.01$

As for Hypothesis 4, it is not empirically supported, as there are no statistically significant differences ($t = -0.58$, $p > 0.05$). However, in terms of sample data, private banks mention more SDGs in their reports than public banks in the economic pillar.

5. Conclusions

In conclusion, our study has provided valuable insights into the evolving landscape of Sustainable Development Goals (SDGs) within the banking sector, which reveals a notable upward trend. This signifies a growing awareness and commitment among banks to incorporate SDGs into their reporting practices over the years. Notably, SDG7 and SDG15 have experienced significant spikes in mentions, increasing from 2015 to 2022, respectively.

Furthermore, our analysis has yielded significant findings regarding the disclosure of SDGs in reports by banks. Public banks were found to mention SDGs more frequently than their private counterparts, thus providing empirical support for Hypothesis 1. This divergence in reporting practices between public and private banks underscores the importance of considering ownership structure when assessing SDG disclosure.

In alignment with Hypotheses 2 and 3, we observed statistically significant differences in SDG mentions between public and private banks in the environmental and social pillars. Public banks consistently mentioned a higher number of SDGs in these areas, emphasizing their stronger commitment to sustainability and social responsibility, but not showing difference on economic pillar.

In sum, our study sheds light on the evolving landscape of SDG reporting in the banking sector, highlighting the increasing prominence of SDGs, and showing an empirical difference between SOB and POB on SDG reporting. These findings offer valuable insights for policymakers, stakeholders, and financial institutions as they navigate the complex terrain of sustainable banking practices and disclosure.

5.1. Limitations and further studies

A limitation of this study is the size of the dataset. It would be more appropriate to replicate the study with data from a larger number of banks. A second limitation concerns the keywords used. Some words on the list may be applicable in different contexts, potentially yielding less precise results. Additionally, the study solely relies on annual reports and integrated reports, omitting cases where banks no longer produce annual reports. Incorporating other sources of company data into the search could enhance the study's comprehensiveness.

Another point of consideration is that at times, certain SDG-related information is presented in image format, reducing the accuracy of text-based searches. Therefore, the utilization of Optical Character Recognition (OCR) or more advanced Natural Language Processing (NLP) technologies like Large Language Model (LLM) models could yield more precise results.

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