

Evaluation of France, Canada, and the USA in Terms of Economic, Social, and Environmental Criteria with the Topsis Model¹

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Multiple Attribute Decision Methods (MADM) are tools used in the field of managerial decision-making to determine the best option among different alternatives. In our study, one of these methods, the TOPSIS method, was employed. The objective of the study is to rank sample countries in terms of environmental, social, and governance dimensions by examining sustainability reporting at the company level and at the country level. Within this scope, Canada, France, and the USA were selected. These countries were analysed based on 12 sub-criteria related to the economic, social, and environmental main criteria, and as a result of the study, the top-performing countries were identified as Canada, the USA, and France, respectively.

Keywords: *TOPSIS Analysis, Sustainability Reporting, Global Warming, Climate Change*

Introduction

The aim of this study is to evaluate France, Canada, and the United States in terms of economic, social, and environmental criteria using the TOPSIS method to determine the best-performing country. From a comparative perspective, focusing on these three countries enables an analysis of sustainability performance across advanced economies operating under different institutional and regulatory settings. France represents the European Union context with increasingly mandatory sustainability reporting frameworks, Canada reflects a hybrid system influenced by international standards, and the United States follows a predominantly market-driven approach under US GAAP.

The economic, social, and environmental criteria are matched with the Environmental, Social, and Governance (ESG) dimensions used in sustainability reporting. In parallel with major environmental regulations such as the Grenelle Law in France, the National Environmental Policy Act in the United States, and Natural Resource Policy initiatives in Canada countries have developed macro-level sustainability policies, while firms have increasingly adopted sustainability reporting practices at the micro level. Accordingly, this study analyses sustainability reporting at the company level in conjunction with national-level sustainability indicators.

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In addition to the numerous benefits of sustainability reporting for both the public and companies, it is evident that different countries and sectors exhibit variations in this reporting, and the quality of reports also differs from one country to another. Some of the fundamental reasons for such differentiation include the predominantly voluntary nature of sustainability reporting, companies determining what to include in their reports and how to present it, local authorities exerting pressure on reporting, and idiosyncratic trends varying from one country to another (Cho et al., 2020). In the realm of CSR, non-financial reporting, and ESG reporting, the year 2015 holds significant importance. In 2015, the Sustainable Development Goals (SDGs) were adopted by all United Nations member states, and the Paris Agreement acknowledged the need to limit global warming to below 2 degrees, with an aspirational goal of 1.5 degrees (Dinh et al. 2023).

According to the World Energy Outlook report released by the International Energy Agency (IEA) in October 2023, it has been stated that proven policies and technologies exist to align energy security with sustainability. However, due to the rapid changes in the past 10 years and the 1.5°C target, it has become highly unlikely, with a 50% probability, that energy-related CO₂ emissions will peak in the mid-2020s. Furthermore, it is projected that the global average temperature will increase to approximately 2.4°C by the year 2100. These projections are explained in the Stated Policies Scenario (STEPS) (IAE 2023), which provides a projection based on the most current policy settings, including energy, climate, and associated industrial policies.

In this study, firstly, sustainability reporting will be defined, and international regulations will be explained, with a focus on Canada, the European Union, specifically France, and the USA. Following that, within this section, research examining the relationship between sustainability reporting performance and companies' financial performance will be discussed, considering sectoral and country-specific studies. The aim is to draw attention to sectoral and national variations. In the third section of the study, the impacts of global warming on both accounting practices and policies are discussed, as well as the country-specific statistical data regarding environmental protection costs. In the fourth section, the TOPSIS analysis conducted within the scope of our research is initially explained among the Multiple Attribute Decision Methods. Subsequently, research data are presented, focusing on the sample countries: Canada, France, and the USA. Then, the analysis process and results section provides insights into the research findings.

Although Multi-Attribute Decision-Making (MADM) techniques, particularly TOPSIS are widely employed in the literature to evaluate sustainability, competitiveness, and environmental performance at the national level, a substantial number of existing studies rely on aggregated indices or focus on a single dimension of sustainability. In addition, sustainability assessment and sustainability reporting are typically addressed as separate analytical domains, despite their increasing conceptual and practical interdependence. This study advances the literature by explicitly integrating national-level economic, environmental, and social indicators with the Environmental, Social, and Governance (ESG) framework that underpins sustainability reporting standards. Moreover, by examining Canada, France, and the United States, countries characterized by different financial reporting regimes (IFRS versus US GAAP)

and distinct non-financial disclosure practices, the research provides an institutional and regulatory perspective that remains relatively underexplored in TOPSIS-based sustainability assessments. Consequently, the study offers a conceptually grounded and policy-relevant application of the TOPSIS method that bridges national sustainability performance with sustainability reporting and regulatory contexts.

Sustainability Reporting

The ESG framework encompasses three main categories: environmental, social, and governance. The Environmental category encompasses topics such as waste management, emissions impact, air pollution, energy efficiency, water pollution, and the protection of the environment and biodiversity. The Social category includes issues like safeguarding human and labor rights, working conditions, health and safety, gender diversity, and anti-corruption measures. Governance, on the other hand, covers matters such as ownership and structural transparency, shareholder rights, diversity, data transparency, business ethics, executive compensation fairness, and the independence and oversight of the board of directors. Sustainability reporting aims to measure companies' activities in these areas and manage related risks to create a better environment, as reflected in the studies and standards in the field (EY 2021).

Sustainability reporting, as per the Canadian CPA 2013 definition, refers to companies disclosing their social, environmental, and governance performance, as well as sharing their values, priorities, and action plans in these areas with stakeholders. Sustainability reporting facilitates communication between companies and stakeholders and plays a role in reducing information asymmetry (Cho et al. 2020).

The terms 'Corporate Social Responsibility' and 'sustainability' are often used interchangeably, with CSR primarily encompassing social issues and sustainability focusing more on environmental concerns. Sustainability reporting, on the other hand, refers to the reporting of non-financial (environmental and social) activities and the performance of companies in these areas. In its 2016 report, the Association of Chartered Certified Accountants (ACCA) defined the concept of 'CSR' as 'relevant for understanding a company's long-term economic value and contribution towards a sustainable global economy, taking account of the company's economic, environmental, social, and governance performance and impacts' (Dinh et al. 2023).

Canada

When it comes to environmental, social, and governance (ESG) disclosures in Canada, companies rely on guidelines such as the Global Reporting Initiative (GRI) Standards, the United Nations Sustainable Development Goals (UN SDGs), and the Task Force on Climate-Related Financial Disclosures (TCFD), much like other European Union countries and the United States. Companies prepare their reports based on these guidelines. They aim to provide disclosures that benefit all stakeholders, including customers, employees, suppliers, communities, and shareholders.

Sustainability reporting in Canada had its beginnings with the publication of "The Natural Resource Policy Issues in Canada" by the Science Council of Canada in 1973. Subsequently, Canada's entry into the Kyoto Protocol in 1998, the Copenhagen Accord in 2009, and the Agenda 2030 were significant milestones. Additionally, specific Canadian initiatives include the National Round Table (1988), the Turning the Corner Plan (2007), and the Federal Sustainable Development Strategy (2016) (Cho et al. 2020).

While publicly traded companies in Canada are required to make certain disclosures under the social category, such as workforce diversity and the visibility of all minority groups, they are not subject to mandatory reporting. The Ontario's Capital Markets Modernization Taskforce 2021 report encourages mandatory reporting, particularly emphasizing compliance with TCFD recommendations and the disclosure of information related to climate change (EY 2021).

EU Countries and France

The sustainability agenda and the goal of becoming a climate-neutral continent for European countries were introduced with the European Green Deal in 2019. In this context, the Non-Financial Reporting Directive 2014/95/EU can be considered a significant sustainability investment within the European Union. The European Commission, in alignment with the United Nations, also publishes statements aimed at ensuring transparency in sustainability performance for companies. In summary, key sustainability initiatives can be exemplified by the adoption of the UN's 2020 Agenda for Sustainable Development and the Paris Agreement in 2015, the publication of Directive (EU) 2017/828 and Guideline 2017/C 215/01 in 2017, and Directive 2014/95/EU in 2018 (Dinh et al. 2023).

Following the law aimed at environmental protection published on July 10, 1976 (Loi n. 76-629, 1976), environmental regulations in France gained momentum with the Grenelle Law starting in 2007. On August 3, 2009, the Grenelle 1 Law (Loi Grenelle 1) set goals related to post-global warming regulations and objectives concerning greenhouse gas emissions to be achieved by 2050. Biodiversity, natural resources, climate change, the interaction between nature and public health, and production and consumption models are among the most prominent topics. With the Grenelle 2 Law on July 12, 2010, issues such as climate, energy, biodiversity, and ecological management models became even more prominent (République Française 2019).

The United States and International Regulations

In the United States and many other countries, standards and recommendations published by the IFRS Foundation are taken into consideration. The Financial Stability Board's TCFD, with its climate-focused approach, has become a significant reference point. The TCFD standards, initially released in 2015 and serving as a benchmark for climate-related information, have been adopted by over 1,700 companies as of 2019. In North America, 779 companies have reported in accordance with this guidance (EY 2021). The National Environmental Policy Act (NEPA) was signed into

law on January 1, 1970. NEPA requires federal agencies to assess the environmental effects of their proposed actions prior to making decisions (NEPA 2023).

Sustainability Reporting Performance

Regulatory and standard-setting authorities, notably the International Financial Reporting Standards Board, focus on the impact of global climate change and sustainable development on financial reporting in their efforts related to sustainability reporting. Research in the field of sustainability reporting highlights significant deficiencies, particularly in corporate accountability and voluntary disclosures made by public companies (Adams 2022). The Global Reporting Initiative (GRI), along with the assessment of past, present, and future considerations in sustainability reporting, considering the interaction with the International Financial Reporting Standards, underscores the global significance of this issue (de Villiers 2022).

The growing mandatory sustainability reporting in countries encourages companies to adopt sustainable business models (Abela 2022). The European Parliament, as part of its sustainable economy initiatives, has adopted new reporting rules for multinational corporations on November 10, 2022. With this regulation, the aim is to promote transparency for large-scale firms in environmental, social, and governance matters, and for EU countries' companies to lead in the implementation of global sustainable reporting standards. It has been announced that initially around 50,000 companies will be subject to this new regulation (European Parliament 2022).

It is observed that the European Commission, the European Financial Reporting Advisory Group (EFRAG), and the International Financial Reporting Standards Board work in synergy (Giner 2022). Both sustainability reporting and integrated reporting have become crucial in enabling investors to access valuable financial information (Permatasari, 2021). Furthermore, the United Nations Sustainable Development Goals (UN SDGs) and the conceptual framework of sustainable reporting complement each other. Companies aim to report their levels of achieving sustainable development goals through this (Abeysekera 2022).

Table 1. *The Evaluation of the Relationship Between Sustainability Reporting and Financial Performance Across Different Sectors and Countries*

Author, Year	Country	Sample	Dependent/Independent Variable	Result
Dalal, Thaker, 2019	India	Public companies in India	ESG scores / Profitability ratios / Company value	It has been found that ESG performance positively influences financial performance and market-based measurements.
Buallay et. al., 2020	USA	Financial crisis periods, banking sector, 882 banks, 11 years after 2008	ESG score / Return on assets, Return on equity, Tobin's Q	ESG scores enhance the financial reporting and market-based performance of banks.
Mans-Kemp, van der Lugt., 2020	South Africa	Top 100 companies on the Johannesburg Stock Exchange, 2013-2018	ESG scores / Various financial indicators	The quality of integrated reporting is significantly associated with ESG performance, earnings per share, and leverage ratio.
Buallay, 2021	Multi-national	The food industry, 2008-2017, 31 different countries, 1426 observations	ESG scores / Return on assets, Return on equity, Tobin's Q	A significant relationship has been found between ESG scores and financial performance.
Wieczorek-Kosmala, 2021	Europe	European energy sector companies, 2013 - 2020 period	ESG scores / Yield ratios	A significant relationship has been found between company returns in the energy sector and ESG scores.

The studies in Table 1 reveal significant results between companies' ESG scores and different financial indicators in various sectors. Research on the impact of mandatory sustainability reporting, which is becoming compulsory in many countries, on these relationships will contribute to the literature. In our study, we aim to rank Canada, France, and the United States in terms of sustainability reporting, which is evidently different across countries, using country-specific criteria.

Environmental Protection Investments

Today, it is stated that global warming affects every area. Accounting practices and policies have also been affected by global warming. Social and environmental reporting and the effects of global warming require reporting of non-financial information as well as financial reporting. The European Union's Green Deal is among the developments that draw attention in this regard. In addition, issues such as energy crises, biodiversity, land use, deforestation, and air and water pollution have become important. In traditional cost systems, the costs incurred to prevent these problems and environmental effects are ignored. However, today's studies in the field of accounting and the increasing importance of sustainability show that both areas should be considered together in business processes, and therefore traditional methods should be developed by considering environmental costs.

James R. Aldrich (1996) explained the concept of externality in terms of microeconomics and expressed that the consumer's actions in the marketplace are involuntarily dependent on the actions of the other. This commitment can result in either cost or benefit. He stated that environmental pollution is a good example of a negative externality. If negative externalities are not included in the cost of products and services, it will lead to under-pricing and overproduction.

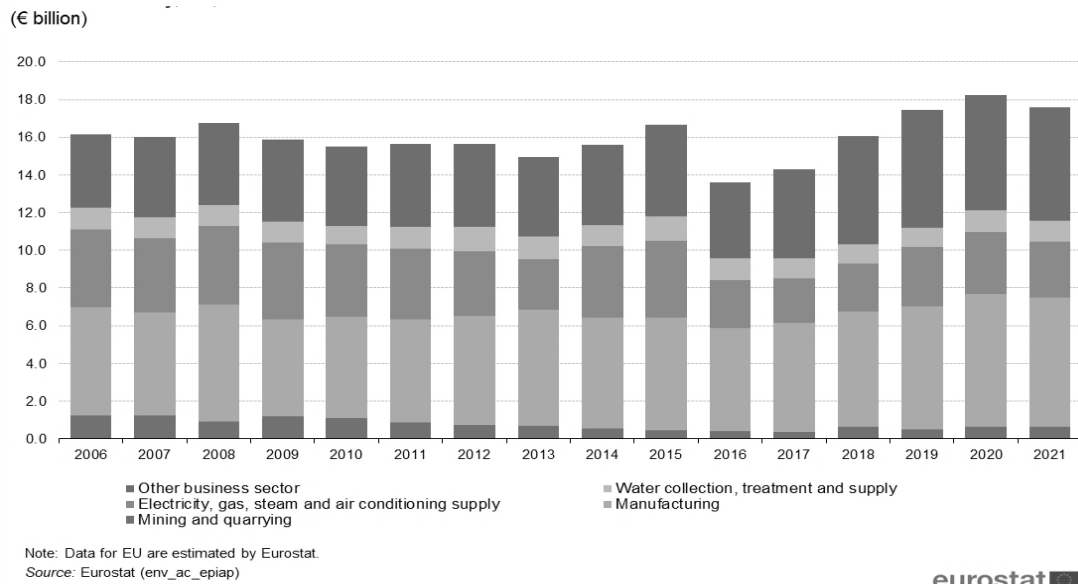
The polluter pays principle states that the social and environmental costs arising from the polluters should be determined. Businesses have to directly allocate these costs to their goods and services (Dascalu et al. 2009). Internalization of positive externalities refers to the introduction of an incentive system for companies that carry out protective activities for environmental and social benefits such as research and development, environmental protection, education, and regional development. It can be thought of as a positive case model of the polluter pays principle.

Estes (1976) expressed the importance of socio-economic issues in accounting with topics such as national income accounting, evaluation of social programs, the role of accounting in economic development, and the creation of a social development index. However, when it comes to today, it is seen that the research areas that attract attention are different.

The European Commission has adopted a package of recommendations that will enable the EU to reduce net greenhouse gas emissions by at least 55% by 2030 when compared to 1990 levels in the areas of climate, energy, transport, and tax. On December 11, 2019, the EU Commission introduced the European Green Deal in Brussels, aiming to achieve climate neutrality by 2050 (European Commission 2019).

In Figure 1, which is established for the years 2006-2021, we observe that the highest percentages of the total Environmental Protection Expenditure Accounts (EPEA) investments made by corporations other than specialist producers to mitigate the environmental harm caused by current production technologies were made by the manufacturing sector (39%) and other business sectors (34%) in 2021. About 23% of the total was made up of utility company investments, while 4% was derived from mining and quarrying (Eurostat 2022a).

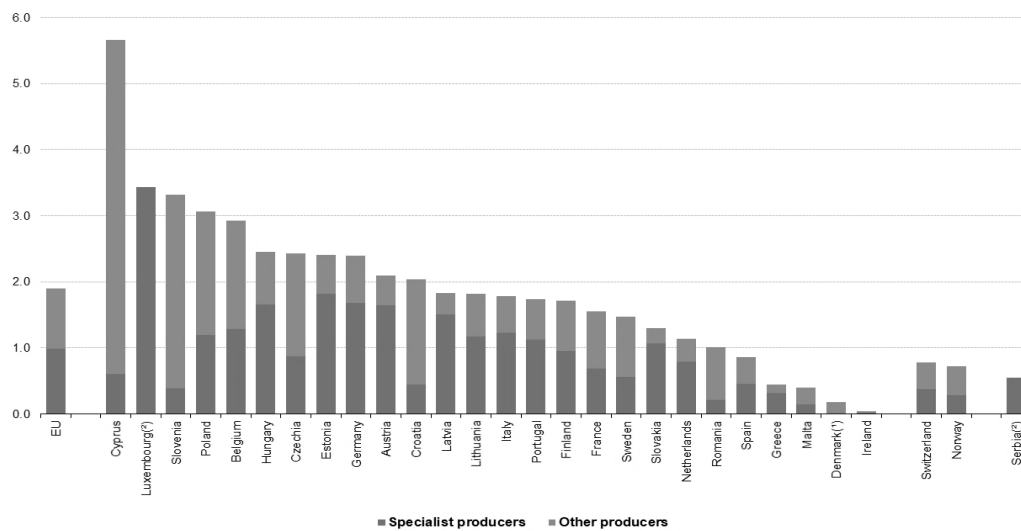
Figure 1. Environmental Protection Expenditures of Corporations other than Specialist Producers by Economic Activity, EU, 2006-2021



eurostat

According to data from European Union member states shown in Figure 2, the share of investments in environmental protection in total investments differed among countries in 2019 and varied from 0.1% to 5.6% of total investments (Eurostat 2022b).

Figure 2. Investments for Environmental Protection by Corporations, 2019
(% of corporations' total investments)



Notes: data for EU are estimated by Eurostat.
Total investments include gross fixed capital formation and acquisitions less disposals of non-financial non-produced assets of corporations from annual sector account (National Accounts).
Bulgaria, Iceland and Turkey are not included in this graph given that data from annual sector accounts for corporations are not available.

(¹) Specialist producers: environmental protection investments not available.

(²) Other producers: environmental protection investments not available.

Source: Eurostat (env_ac_epissp), (env_ac_epiap) and (nasa_10_nf_tr)

eurostat

We also examined data from Canada (Statistics Canada 2022). Almost 9 out of 10 Canadian businesses reported investing in environmental protection in 2019. In the concerned year, the percentage of Canadian businesses reporting environmental protection expenditure was 87%. Environmental protection activities and resource management activities are two main categories of activity recognized under environmental protection expenditures. Environmental protection activities reduce the negative effects on the environment and the intensity of resource consumption. The prevention, reduction, or removal of pollution are all part of resource management activities. The majority (60%) of companies in the paper manufacturing sector made large investments in technology to enhance resource management. They were followed by companies in the production, transmission, and distribution of electric power (58%) and companies in the distribution of natural gas (44%).

The Cost of Global Warming

In 2006, the economist Nicholas Stern conducted the first comprehensive examination of the economic aspects of climate change in England. Nicholas Stern's analysis indicated that maintaining carbon dioxide (CO₂) levels at 450 parts per million (ppm) would necessitate an expenditure equivalent to approximately 3% of the global GDP annually by the year 2050. If levels were stabilized between 500 and 550 ppm, the cost would be approximately 1% of GDP per year. Stern's findings suggested that, without intervention, the cumulative global cost of climate change over a decade would amount to roughly 5,500 billion euros.

Stern advocated for a commitment from humanity to allocate 1% of the world's annual gross product, which translates to nearly 275 billion euros over the course of a decade, for mitigating greenhouse gas (GHG) emissions and other factors contributing to global warming. Without such action, the costs could escalate to 5-20 times higher than this estimate. To put this 1% commitment into perspective, it is approximately equivalent to the annual global spending on advertising, and according to the World Bank, it is twice the cost of dealing with a flu pandemic. Stern recommended that the distribution of this spending be proportional to each country's share of the global GDP (Bréon & Luneau 2015). By 2016, Nicholas Stern's predictions appeared to hold true. The average annual cost of natural disasters worldwide amounted to approximately 116.5 billion euros.

Carbon Management and Cost Accounting

The study, which draws attention to the importance of collecting, managing, and reporting carbon-related information, explained the reasons why businesses focus on this issue under three main headings. These include the increase in emission trading systems, the need for standardized measurement of carbon emissions for use in corporate reports, and the growing public interest in carbon management with the increasing global warming (Burritt et. al 2011).

Hu et al. (2022), on the other hand, listed the increase in the need for energy demand and the increase in this demand causing environmental problems among the important reasons in this regard. The study classified carbon emission costs into

prevention costs, governance costs, maintenance costs, losing costs, and contingent costs. Prevention costs include research and development expenses to reduce carbon emissions. Governance costs include recycling costs. Contingent cost includes costs such as carbon emission quotas, carbon taxes, and transaction costs. He also counted material flow cost accounting and life cycle assessment methods among the methods used in the measurement of carbon emission costs.

Dascalu et al. (2009) developed the traditional full-cost accounting model in their study and revealed the eco-costing model which was included in the costs of sustainable developments and environmental reporting. Ratnatunga et al. (2009), on the other hand, explained carbon allowances, low-carbon dioxide emission technologies, and the calculation of carbon costs resulting from increased carbon emissions and climate change.

Table 2. *Classification of Traditional vs. Environmental Costs*

Traditional Overhead Expenses	Environmental Overhead
Electricity, Rental, Transportation	Regulatory Costs (Regulations on carbon emissions)
Administration, Marketing	Waste management
Depreciation of Machinery	Amortization of Design Costs
After-sale Service Costs	Carbon Credits

According to Ratnatunga et al. (2009) and reprinted.

Ratnatunga et al., (2009) stated in Table 2, that carbon costs throughout the life cycle of products and services should be analyzed with the help of strategic cost management systems. Direct and indirect costs are evaluated in traditional cost systems (Hacırustemoğlu 2001, Basık et al. 2006). In carbon cost accounting, environmental costs should be evaluated in terms of raw materials, labor, overhead, waste management, and recycling.

Method

In this study, the TOPSIS method, which is one of the Multiple Attribute Decision Methods, has been used. In this section, we will first explain the TOPSIS method, and then we will delve into the data, sample, and analysis process.

Recent research has increasingly applied multi-criteria decision-making (MCDM) approaches to evaluate sustainability and competitiveness across countries. Valasková et al. (2022) conducted a comparative analysis of selected European economies, assessing the quality of their business environments through the TOPSIS method combined with global indices such as the Global Competitiveness Index, Corruption Perception Index, and Doing Business Index over the 2013–2020 period. Their findings revealed clusters of countries with similar business characteristics, notably identifying Slovakia, Hungary, and Croatia as having comparable business environments that may support regional competitiveness.

Similarly, Hajduová et al. (2021) examined the link between sustainable development and economic performance among EU member states, applying TOPSIS and Entropy methods based on EUROSTAT data. Their results showed that Northern

and Western European countries, such as Sweden and Denmark, outperform Southern and Eastern European countries due to stronger environmental and social indicators.

Extending this line of inquiry, Menten and Çekiç (2023) applied the TOPSIS method to rank G20 countries according to their energy production sources and sustainability performance between 2020 and 2022. By comparing the outcomes under equal and environmentally weighted scenarios, they demonstrated that the United States and the European Union consistently rank highest, while China and Saudi Arabia perform lowest when environmental criteria gain more weight.

Collectively, these studies highlight the versatility of MCDM techniques—especially TOPSIS—in providing quantitative, comparative assessments of sustainability, competitiveness, and environmental performance across nations. They also emphasize the growing importance of integrating economic, social, and environmental dimensions in evaluating national development and policy effectiveness.

Multiple Attribute Decision Methods

MADM methods are tools in managerial decision-making used for assessing competing alternatives characterized by multiple attributes. MADM, identified as an aiding technique, involves appraising and selecting alternatives that are distinguished by multiple criteria attributes. MADM problems come in various forms, yet they all exhibit the following shared characteristics (Yoon & Hwang 1995):

Alternatives: A finite set of alternatives is chosen and may also be ranked. The term "alternative" is interchangeable with words like "option" or "action," and others with similar meanings.

Multiple Attributes: Every problem involves numerous attributes. The term "attributes" can also be denoted as "goals" or "criteria".

Units that cannot be compared or measured using a common scale: Every attribute is characterized by distinct units of measurement.

Weights assigned to attributes: Most MADM methods necessitate data concerning the relative significance of each attribute, typically obtained through an ordinal or cardinal scale.

A decision matrix: This is a tabular representation of different alternatives and criteria used to evaluate and make decisions. Columns in a decision matrix represent the attributes under consideration in a particular problem, while the rows list the competing alternatives.

TOPSIS

In this study, we have chosen TOPSIS which is one of the methods of MADM developed by Hwang and Yoon (1995). Although the other methods (AHP, ELECTRE... etc.) have many advantages, TOPSIS is the best method for our study since it has an appropriate structure decreasing the response time for the information obtained from the experts who contributed to our research.

TOPSIS is based on the principle where the chosen alternative should be the one that is the closest to ideal alternative and the furthest from the negative-ideal alternative (Yoon & Hwang 1995). TOPSIS uses the following six steps:

Standardization of the data: Vector standardization is used to compute normalized data.

$$r_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^m x_{ij}^2}} \quad i = 1, 2, \dots, m; j = 1, 2, \dots, n \quad (1)$$

where x_{ij} indicates the effective output of the i^{th} alternative with regard to j^{th} criterion.

Calculation of the weighed normal data: Weighted normalized data are determined through the following process:

$$v_{ij} = w_j r_{ij} \quad i = 1, 2, \dots, m; j = 1, 2, \dots, n \quad (2)$$

where w_j is the weight of j^{th} criterion.

Determination of the ideal and anti-ideal solutions: The ideal solution (A^*) and the anti-ideal solution (A^-) are defined in terms of weighed normal values as follows:

$$\begin{aligned} A^* &= \left\{ (\max_i v_{ij} | j \in J), (\min_i v_{ij} | j \in J'), i = 1, 2, \dots, m \right\} \\ &= \{ v_{j^*}, j = 1, 2, \dots, n \} \\ A^- &= \left\{ (\min_i v_{ij} | j \in J), (\max_i v_{ij} | j \in J'), i = 1, 2, \dots, m \right\} \\ &= \{ v_{j^-}, j = 1, 2, \dots, n \} \end{aligned} \quad (3)$$

where j is the whole of criteria of profit and i is the whole of criteria of cost.

Calculation of measurements of distance: The Euclidean dimensional distance of n can measure the distance between the alternative solutions. The distance from each alternative ideal and anti-ideal solution are then indicated by:

$$\begin{aligned} D_i^* &= \sqrt{\sum_{j=1}^n (v_{ij} - v_{j^*})^2}, i = 1, 2, \dots, m \\ D_i^- &= \sqrt{\sum_{j=1}^n (v_{ij} - v_{j^-})^2}, i = 1, 2, \dots, m \end{aligned} \quad (4)$$

Calculation of the proximity to the ideal solution:

$$C_i = \frac{D_i^-}{D_i^* + D_i^-}, i = 1, 2, \dots, m \quad (5)$$

where C_i indicates the proximity of the i^{th} alternative to the ideal solution. Denote that $0 \leq C_i \leq 1$, where $C_i = 0$ when $A_i = A^-$ and $C_i = 1$ when $A_i = A^*$

Determination of the order of preference: The alternative solutions are arranged in a descending order.

Data and Sample

The selection of the United States, Canada, and France as the sample countries is based on their distinct yet comparable approaches to financial and non-financial reporting frameworks. The United States adopts its own national accounting standards, the U.S. Generally Accepted Accounting Principles (US GAAP), issued by the Financial Accounting Standards Board (FASB), whereas both France and Canada mandate the application of the International Financial Reporting Standards (IFRS) developed by the International Accounting Standards Board (IASB) for their publicly listed companies. These regulatory frameworks exhibit both convergences and divergences in terms of disclosure requirements and reporting practices. Similarly, in the context of non-financial (sustainability) reporting, national and international practices within these countries display notable differences and similarities across the environmental, social, and governance (ESG) dimensions, reflecting the varying institutional, regulatory, and cultural contexts in which reporting systems operate.

The data have been obtained and compiled from the World Bank and OECD databases. As explained in the Table 3, three main criteria have been used. The main criteria are defined as Economic (C1), Environmental (C2), and Social (C3). Under the Economic main criterion, four sub-criteria can be listed as GDP per capita (SC11), unemployment total (SC12), inflation (SC13), and interest rate (SC14). Under the environmental main criterion, four criteria can be listed as CO2 emissions (SC21), forest area (SC22), annual freshwater withdrawals (SC23), and environmental tax (SC24). Under the social main criterion, four sub-criteria have been used, namely, total population (SC31), net migration (SC32), Human Capital Index (SC33), and education attainment level (SC34).

Table 3. Types of Criteria

Main Criteria	Sub-Criteria	Resources
Economic (C1)	GDP per capita	WorldBank
	Unemployment total	WorldBank
	Inflation	WorldBank
	Interest rate	OECD
Environmental (C2)	CO2 emissions	WorldBank
	Forest area	WorldBank
	Annual Freshwater withdrawals	WorldBank
	Environmental Tax	OECD
Social (C3)	Population total	WorldBank
	Net migration	WorldBank
	Human Capital Index	WorldBank
	Education Attainment level	WorldBank

Table 4. Country-Specific Data for Sub-Criteria

Number	Sub-Criteria	France	Canada	USA
1	GDP per capita (Current USD) (*)	40963	54966	76398
2	Unemployment total (-)	0,074	0,052	0,036
3	Inflation (-)	0,05200	0,06800	0,08000
4	Interest rate (-)	0,02620	0,02640	0,03620
5	CO2 emissions (-)	4,00000	13,60000	13,00000
6	Forest area (*)	0,31700	0,39500	0,33900
7	Annual freshwater withdrawals, total (-)	0,13000	0,01000	0,16000
8	Expenditure on environmental protection sector (*)	0,02280	0,01600	0,00620
9	Population growth (*)	0,00300	0,01800	0,00400
10	Net migration (-)	20614,00000	195181,00000	561580,00000
11	Human capital index (HCI) (*)	0,80000	0,80000	0,70000
12	Education attainment level (*)	0,95000	1,00000	0,92000

Table 4 provides country-specific data for the sub-criteria. Accordingly, the sub-criteria marked with (*) are the ones that have a positive impact on country selection, while those marked with (-) constitute the sub-criteria with a negative impact.

Analysis Process and Results

The standardization of vector is employed to calculate the normal data (Table 4. Country-Specific Data for Sub-Criteria) is shown in the equation (1). Depending on the TOPSIS, the degrees of importance for the criteria and sub-criteria have been equally set at 0.25 (Hajduová et. al., 2021). The weighted normal data are calculated as shown in the equation (2). The ideal solution (A*) and the anti-ideal solution (A-) are defined in terms of weighted normal values as shown in the equation (3). Ideal and non-ideal solutions were obtained by calculating equations (4) and (5). The results of the ideal and non-ideal solutions are included in table 5. Finally, Table 6 shows the ranking of the possible alternatives for the selected countries. According to this, Canada ranks first as it is closest to the ideal solution as described in equation (5) (0.583257717). Following that, the USA and France rank second and third with scores of 0.442080827 and 0.36756734, respectively.

Table 5. Results of the Ideal and Non-ideal Solutions

Sub-Criteria	Ideal Solution	Non-Ideal Solution
SC11	0,062024786	0,033256385
SC12	0,030818304	0,063348735
SC13	0,03698439	0,056899062
SC14	0,042066284	0,058122117
SC21	0,017330112	0,05892238
SC22	0,054010032	0,04334476
SC23	0,004037513	0,064600211
SC24	0,066583515	0,018106044
SC31	0,080293159	0,013382193
SC32	0,078667366	0,002887655
SC33	0,050109735	0,043846018
SC34	0,050261944	0,046240989

Table 6. Ranking of the Possible Alternatives

	France	Canada	USA
Ideal Distance	0,120718571	0,073338871	0,110484341
Anti-ideal Distance	0,070161152	0,102642482	0,087544955
Proximity to the ideal solution	0,36756734	0,583257717	0,442080827
Ranking	3	1	2

Conclusion and Discussion

In this study, we conducted a sustainability ranking of three countries—Canada, France, and the United States—by employing a Multiple Attribute Decision-Making (MADM) approach based on the TOPSIS method. The analysis aimed to evaluate and compare national sustainability performance across economic, environmental, and social dimensions, each represented by four sub-criteria. Data was obtained from the OECD and the World Bank databases, and all criteria were assigned equal weights (0.25) to ensure balance in the comparative evaluation.

Following the standard TOPSIS procedure, the decision matrix was normalized and weighted, after which ideal (A) and anti-ideal (A⁻) solutions were identified for each criterion. The Euclidean distances from these reference points were then calculated to obtain the closeness coefficient (C_i*), which reflects the relative proximity of each country to the ideal sustainability profile.*

The results indicate that Canada achieved the highest closeness coefficient (0.583), followed by the United States (0.442) and France (0.368). Canada's leading position can be attributed to its relatively balanced performance across all three sustainability dimensions, supported by coherent sustainability policies and a comprehensive non-financial reporting framework. The United States ranks second, largely driven by strong economic indicators, although comparatively weaker environmental and social outcomes reduce its overall sustainability performance. France, despite its advanced environmental commitments and social welfare policies,

exhibits relatively lower economic performance within the scope of the selected indicators, which affects its overall ranking.

Beyond the numerical rankings, the findings offer important insights for policymakers, researchers, and practitioners. From a policy perspective, the results underline the importance of integrated sustainability strategies that simultaneously address economic competitiveness, environmental protection, and social inclusion. Canada's performance suggests that policy coherence and transparent sustainability reporting can play a critical role in achieving balanced sustainability outcomes. For the United States and France, the results point to potential areas for policy improvement, particularly in strengthening underperforming sustainability dimensions without undermining existing strengths.

For researchers and practitioners, this study demonstrates the applicability of the TOPSIS-based MADM framework as an effective tool for evaluating sustainability performance at the national level. By adapting decision-making methodologies commonly applied at the firm level to a country-level context, the study helps bridge the gap between corporate sustainability reporting and national sustainability assessment. The framework may also serve as a benchmarking tool for policymakers, regulators, and sustainability professionals seeking to assess and compare national sustainability performance across different institutional settings.

Despite its contributions, this study has certain limitations that should be acknowledged. First, the analysis is limited to three G7 countries, which, while methodologically justified, restricts the generalizability of the findings. Second, the use of equal weighting assumes that economic, environmental, and social dimensions are of equal importance, which may not fully reflect national policy priorities or stakeholder preferences. Third, the analysis is based on cross-sectional data and does not capture dynamic changes in sustainability performance over time. Future research could address these limitations by expanding the sample to include additional countries, applying alternative or scenario-based weighting schemes, and incorporating longitudinal data to examine sustainability trends over time.

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Appendix. Definition of Variables

Variables	
GDP per capita	WorldBank, GDP per capita is gross domestic product divided by midyear population. Data are in current U.S. dollars.
Unemployment total	WorldBank, Unemployment refers to the share of the labor force that is without work but available for and seeking employment.
Inflation	WorldBank, Inflation as measured by the consumer price index.
Interest rate	OECD, Interest can be defined as the price paid by the borrower for the use of funds saved by the lender and the compensation to the lender for deferring expenditures.
CO2 emissions (metric tons per capita)	WorldBank, Carbon dioxide emissions are those stemming from the burning of fossil fuels and the manufacture of cement.
Forest area (% of land area)	WorldBank, Forest area is land under natural or planted stands of trees.
Annual Freshwater withdrawals total (% of internal resources)	WorldBank, Annual freshwater withdrawals refer to total water withdrawals, not counting evaporation losses from storage basins. Data are for the most recent year available for 1987-2002.
Environmental Tax	OECD, Environmentally related taxes are an important instrument for governments to shape relative prices of goods and services.
Population total, growth (annual %)	WorldBank, Annual population growth rate for year t is the exponential rate of growth of midyear population from year t-1 to t, expressed as a percentage.
Net migration	WorldBank, Net migration is the net total of migrants during the period, that is, the number of immigrants minus the number of emigrants, including both citizens and noncitizens.
Human Capital Index, (HCI) (scale 0-1)	WorldBank, The HCI calculates the contributions of health and education to worker productivity.
Education Attainment level	WorldBank, This indicator look at the highest level of education completed by a person.