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A Bibliometric Analysis of the Link Between Financial Crises and Sustainable Finance Using R Studio

Finansal Krizler ve Sürdürülebilir Finans İlişkisinin R Studio ile Bibliyometrik Analizi

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ABSTRACT

This study aims to examine the relationship between financial crises and sustainable finance. In particular, it analyses the potential effects of sustainable finance instruments (green bonds, ESG investments, carbon markets, etc.) on the financial system during crisis periods. Publications obtained by searching the Web of Science database using the keywords "financial crises and sustainable finance" are evaluated using bibliometric analysis methods. Within the scope of the study, changes in the number of publications over the years, the authors, countries and institutions with the most publications, frequently used keywords and collaboration networks are examined. The findings indicate that an increase in publications in this field may be observed following certain crisis periods. It is thought that sustainable finance may play a role in increasing the resilience of the economic structure during times of crisis. It is anticipated that instruments such as green bonds, ESG-based investments, and carbon markets may serve various functions in recovery processes. However, it is also noted that the performance of these instruments may vary depending on market conditions. This study aims to reveal trends in the literature and contribute to further research on the relationship between sustainable finance and financial crises. The data obtained is considered to be indicative for policymakers, investors, and academics.

Keywords: *Financial Crisis, Sustainability Finance, Financial Stability, Bibliometric Analysis*

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ÖZET

Bu çalışma, finansal krizler ile sürdürülebilir finans arasındaki ilişkiyi incelemeyi amaçlamaktadır. Özellikle, sürdürülebilir finans araçlarının (yeşil tahviller, ÇSY yatırımları, karbon piyasaları vb.) kriz dönemlerinde finansal sistem üzerindeki potansiyel etkilerini analiz etmektedir. Web of Science veritabanında "finansal krizler ve sürdürülebilir finans" anahtar kelimeleriyle yapılan tarama sonucunda elde edilen yayınlar, bibliyometrik analiz yöntemleri kullanılarak değerlendirilmektedir. Çalışma kapsamında; yayın sayısının yıllara göre değişimi, en çok yayın yapan yazarlar, ülkeler ve kurumlar ile en sık kullanılan anahtar kelimeler ve iş birliği ağları incelenmektedir. Bulgular, belirli kriz dönemlerinin ardından bu alandaki yayınlarda bir artış gözlemlenebileceğine işaret etmektedir. Sürdürülebilir finansın, kriz zamanlarında ekonomik yapının dayanıklılığını artırmada rol oynayabileceği düşünülmektedir. Yeşil tahviller, ÇSY odaklı yatırımlar ve karbon piyasaları gibi araçların toparlanma süreçlerinde çeşitli işlevler üstlenebileceği öngörülmektedir. Bununla birlikte, bu araçların performansının piyasa koşullarına bağlı olarak farklılık gösterebileceği de vurgulanmaktadır. Bu çalışma, literatürdeki eğilimleri ortaya koymayı ve sürdürülebilir finans ile finansal krizler arasındaki ilişkiye dair gelecekteki araştırmalara katkı sağlamayı hedeflemektedir. Elde edilen verilerin politika yapıcılar, yatırımcılar ve akademisyenler için yol gösterici nitelikte olduğu değerlendirilmektedir.

Anahtar Kelimeler: *Finansal Kriz, Sürdürülebilir Finans, Finansal İstikrar, Bibliyometrik Analiz*

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Kübra Nur KARAKELEŞ

1. Introduction

Financial crises are among the significant phenomena that profoundly affect the functioning of the global economic system, causing market fluctuations and macroeconomic instability. From the Great Depression of 1929 to the Global Financial Crisis of 2008 and the economic downturn caused by the COVID-19 pandemic in 2020, many crises have resulted in various negative consequences, such as increased unemployment, loss of production, and decreased investor confidence (Reinhart and Rogoff, 2009; Stiglitz, 2010). These crises affect not only financial markets but also the real sector, international capital flows, and the direction of economic policies.

Sustainable finance aims to direct financial resources in a way that contributes to long-term development goals, taking into account environmental, social and governance (ESG) criteria (Flammer, 2021). The ESG framework serves as a core metric for evaluating the sustainability and ethical impact of an investment or a company. Specifically, the 'Environmental' (E) pillar focuses on an organization's

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ecological footprint, resource conservation, and climate change mitigation efforts; the 'Social' (S) pillar evaluates relationships with employees, communities, and human rights inclusivity; and the 'Governance' (G) pillar deals with a company's leadership structure, executive compensation, audits, internal controls, and shareholder rights (Gillan et al., 2021). In this context, the question of how financial crises interact with sustainable finance is becoming increasingly important for both academic circles and policymakers.

The main objective of this study is to examine the relationship between financial crises and sustainable finance and to analyse the extent to which sustainable financing instruments, primarily green bonds, ESG investments and carbon markets, are effective during crisis processes. Furthermore, the potential contribution of these instruments to post-crisis economic recovery is assessed; the performance of sustainable investments in the face of crises and the differing dynamics between developed and developing countries are addressed (Gunay et al., 2022; Friede et al., 2015; Koch et al., 2014).

In situations where financial crises can undermine market confidence and render traditional financing methods inadequate, sustainable finance practices can offer an alternative resilience mechanism. In this context, tools such as ESG-focused investments, green financing instruments, and carbon markets can contribute to the creation of more resilient structures against economic fluctuations (Jalles, 2024). This study examines the performance of these tools during crisis periods through both a literature review and bibliometric analysis, presenting implications for policymakers and investors.

At the same time, the effectiveness of sustainable finance in developing countries in the face of crises is specifically addressed, with the aim of contributing to filling the knowledge gap in this area. Findings on the long-term effects of green finance on the stability of the financial system are expected to provide new perspectives that will support sustainable investment decisions (Jaeger et al., 2020).

2. Financial Crises and Sustainable Finance

Crises can be defined as severe fluctuations that cause serious problems in a country's economy by exceeding acceptable limits as a result of sudden and unexpected fluctuations in any goods, services, production factors, or currency markets (Kibritçioğlu, 2001:1-2). Crises are generally divided into real and financial crises, while financial crises are classified into currency crises, banking crises, systemic crises, and external debt crises.

A currency crisis occurs when a country's currency loses value due to speculative effects, authorities rapidly deplete their reserves, or are forced to defend the currency by sharply increasing interest rates (Eichengreen et al., 1995:253). Such crises are observed both in fixed exchange rate systems and in situations of large devaluation beyond a certain band .

A banking crisis manifests itself through bank runs, deposit withdrawals, or deterioration in the asset structure of banks. Structural weaknesses in the banking system are among the key factors triggering such crises.

2.1. Financial Crises

Economic instability and financial crises arise from the convergence of numerous internal and external factors. These factors profoundly affect not only the general economic structure but also vital sectors such as the banking sector. To minimise the negative effects of financial crises, governments and financial authorities implement various preventive and regulatory policies. The main causes of crises include flawed macroeconomic policies, weak financial structures, exchange rate instability, external macroeconomic developments, and inadequate supervision (Caprio et al., 1996: 634). Furthermore, sudden news flows that cause economic actors to reassess their current situation can also trigger crises. The macroeconomic effects of financial crises include a contraction in credit volume, an increase in interest rates, an expansion in money supply, a decline in spending and total demand, a decrease in production and employment, and a decline in savings and investment.

From the perspective of the banking sector, one of the most significant consequences of crises is that depositors lose confidence in banks and, as a result, begin to withdraw their deposits. In this situation, banks are forced to sell off their assets to meet their liquidity needs. If the crisis is limited to only some banks, interventions by central banks in their role as lenders of last resort can prevent a systemic crisis. In addition, deposit insurance schemes are also used as an effective tool to mitigate the effects of the crisis (Kaufman, 2001: 13; Karacan, 1996: 58-59). However, when the crisis spreads more widely, confidence in the banking system weakens and investors turn to safer assets. This process causes many banks to fail and those that survive to suffer serious losses (Zwet and Swank, 2000: 6).

The 2008 global financial crisis went down in history as a deep crisis that began in the US housing market and then spread throughout the world. This crisis caused a serious loss of confidence, particularly in credit markets, leading to rising unemployment rates and a sharp contraction in aggregate demand. Low interest rates and loose credit practices in the US led to the proliferation of risky subprime mortgage loans. Rapidly rising house prices encouraged investors to take on more credit, while rising interest rates from 2004 onwards led to borrowers falling into repayment difficulties. The wave of bankruptcies that began in 2007 deepened in the last quarter of 2008 with bank bailouts. The crisis spread to European countries, causing serious economic recessions in countries such as Greece, Ireland, Portugal and Spain (Ay and Uçar, 2015: 20-21).

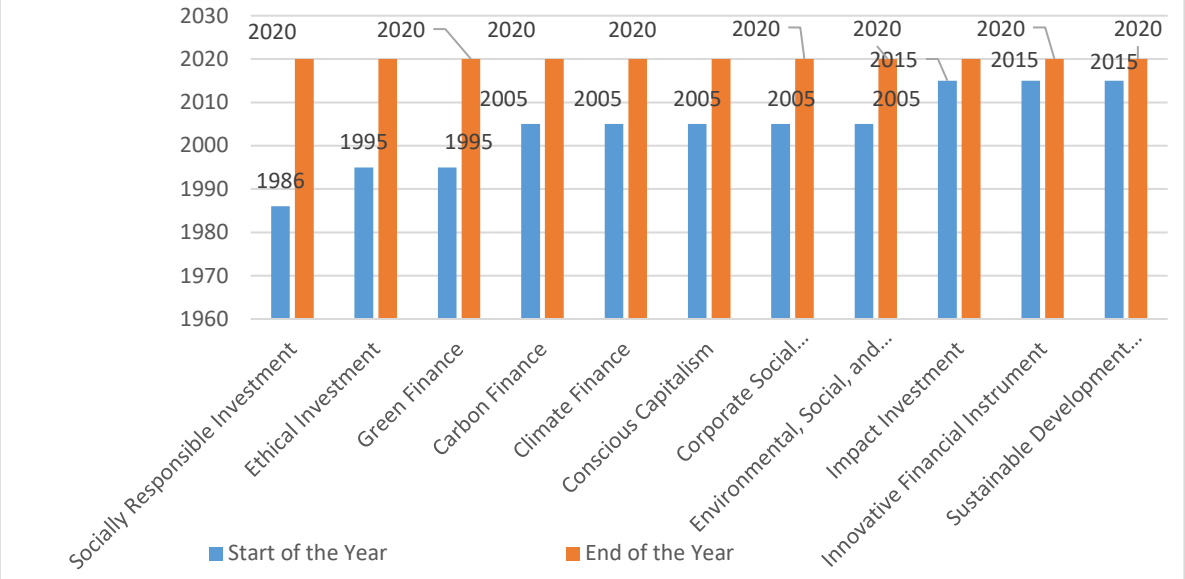
The Covid-19 pandemic, however, affects the economic system with a different crisis dynamic. The pandemic, which affected the whole world in 2020, causes supply-side bottlenecks. The closure of production facilities, the halt of the service sector, and disruptions in the global supply chain negatively affect economic growth. The uncertainty caused by the pandemic increases volatility in financial markets and strengthens the possibility of a global recession (Zhang et al., 2020). While developed countries implemented large-scale fiscal and monetary stimulus programmes, developing countries were able to intervene only to a limited extent due to their limited resources. The financial effects of Covid-19 caused contraction in some sectors, while creating opportunities for rapid growth in others.

2.2. Sustainable Finance

Sustainable finance can be defined as an approach to financing sectors or activities that contribute to the development or improvement of at least one element of sustainability. These elements include areas such as the protection of the environment and ecosystems, the continuity of biodiversity, the reduction of threats to nature, the fight against climate change, the eradication of poverty and hunger, and the reduction of social inequalities. In this context, the concept of sustainable finance does not aim to change the fundamental definition of finance; rather, it expresses how finance can be used as a tool to support sustainable development. Today, this concept is also referred to as "finance for sustainability" (Arslan, 2022:98).

Figure 1 shows that the starting point of sustainable finance is social responsibility investments. Over time, ethical investment and green finance have become fundamental elements of this field. In recent years, sustainable development goals, innovative financial instruments and impact investments have become key topics included in the scope of sustainable finance.

Figure 1
Evolution of sustainable finance research



Source: (Kumar et al., 2022:5).
Note: SDGs Sustainable development goals. ESG Environmental, social and governance. CSR Corporate social responsibility.

Sustainable finance refers to the process of considering environmental and social factors in investment decisions, encouraging a shift towards long-term and sustainable activities. More specifically, environmental factors include climate change mitigation and adaptation, as well as environmental risks such as natural disasters. Social factors include issues such as inequality, inclusivity, labour relations, investment in human capital, and community development. Environmental and social elements are often intertwined, particularly given the potential for climate change to exacerbate existing inequalities.

However, elements such as the governance mechanisms of public and private sector organisations, labour relations and executive remuneration policies play a critical role in integrating environmental and social factors into decision-making processes (EU, Action Plan, 2018:2). This action plan, prepared within the scope of sustainable finance, is presented as part of a broader strategy for the benefit of the planet and society by aligning finance with the specific needs of the global and European economies. The action plan aims to achieve the following key objectives (EU, Action Plan, 2018:2):

1. To redirect capital flows towards sustainable investments in order to ensure sustainable and inclusive economic growth,
2. Effectively managing financial risks arising from climate change, depletion of natural resources, environmental degradation and social issues,
3. To promote long-term perspectives by increasing transparency in financial and economic activities.

3. Literature

As the research is a bibliometric analysis study, the literature section has been summarised under four headings without being expanded too much.

3.1. Dynamics and Effects of Financial Crises:

Financial crises typically emerge as sudden collapses triggered by factors such as asset price bubbles, excessive leverage, and inadequate regulation (Aydın, 2024). For example, the 2008 global financial crisis led to a severe banking collapse as a result of the housing market bubble and the lack of oversight of financial innovations. Crises create effects such as a sharp decline in economic activity, increased unemployment, and the bankruptcy of financial institutions (Aydın, 2024). From a sustainable finance perspective, there have been calls for the financial system to be reshaped with a more long-term and responsible outlook in the aftermath of crises. Indeed, following the 2008 crisis, the "green transition" was brought to the agenda to revive the economy, emphasising the need for the financial system to take greater account of environmental and social risks (Gunay *et al.*, 2022). Studies conducted at the company level in the literature discuss the role of environmental and social responsibility performance during crisis periods. Some findings *indicate that companies with* high corporate social responsibility (CSR) *scores are more financially resilient during crises. For example, during the 2008 crisis, the stock returns of companies with high CSR levels declined significantly less than those of companies with low CSR levels (Lins et al., 2017). This suggests that stakeholder trust and reputation can act as a cushion for companies during difficult times. However, other studies have produced conflicting results. Bouslah et al. (2018) noted that companies with high social performance did not experience reduced risk during the financial crisis; on the contrary, these companies exhibited lower financial performance throughout the crisis. Similarly,* it is emphasised that *companies* are *forced to cut CSR spending during economic downturns*, and that short-term survival concerns can take precedence over sustainability goals (Bouslah *et al.*, 2018).

Therefore, the relationship between financial crises and sustainability performance is a controversial topic in the literature. Nevertheless, in recent years, financial authorities have drawn attention to the fact that sustainability risks, such as climate change, could lead to new financial crises in the future (Carney, 2015). In summary, when examining the dynamics of financial crises, how these crises affect the business world's approach to sustainability emerges as an important theme, in addition to their economic effects.

Recent empirical studies reinforce the vital role of environmental, social, and governance (ESG) performance as a catalyst for corporate and systemic resilience during global exogenous shocks, such as the COVID-19 pandemic and subsequent financial volatility (Yahya, 2023). Research analyzing corporate behavior during the pandemic reveals that a commitment to robust ESG practices significantly improves financial ratios, with sustainability acting as a protective buffer for

firm revenue, profitability, and market valuation during lockdown periods (Ateş & Gürler, 2024; Yahya, 2023). Furthermore, the financial stability provided by ESG integration extends beyond the real sector into the banking industry (Conca et al., 2026). A recent analysis of European listed banks in the post-crisis era indicates that greater transparency—specifically in social disclosures—is negatively and significantly associated with non-performing loan (NPL) levels, thereby strengthening credit quality and overall financial resilience (Conca et al., 2026). These contemporary findings collectively demonstrate that sustainability metrics are not merely post-crisis recovery tools, but strategic drivers that proactively enhance resilience against modern economic crises (Ateş & Gürler, 2024; Conca et al., 2026).

3.2. Sustainable Finance Instruments:

The literature extensively covers the role of instruments such as green bonds, carbon markets, and sustainable investment funds in financial crisis environments. Green bonds are debt instruments issued with a commitment to channel the proceeds into environmentally friendly projects. The green bond market, which gained momentum after 2008, continued to grow even during the crisis period and offered new opportunities for governments and companies to finance sustainable infrastructure investments. Research shows that companies issuing green bonds receive a positive response in the stock market and tend to improve their environmental performance in the post-issuance period (Flammer, 2021). Thanks to strong investor demand, green bonds generally offer slightly lower yields ("green premium" or greenium) compared to traditional bonds with similar maturities, which can reduce financing costs for issuers. Carbon markets, on the other hand, are sustainable finance mechanisms that encourage companies to reduce emissions by putting a price on greenhouse gas emissions. However, carbon markets have been observed to be fragile during economic crises. For example, during the 2008 global financial crisis, carbon prices in the European Union Emissions Trading System fell rapidly from around €30 per tonne to around €5 per tonne (Koch et al., 2014). This collapse in demand demonstrated that carbon markets are affected by economic cycles and, when left solely to market dynamics, can be an unstable incentive for environmental investments. Therefore, the literature discusses the need for regulatory measures, such as market stability mechanisms and floor price applications, to increase the resilience of carbon markets to crises. Sustainable investment funds (e.g., ESG-themed funds or socially responsible investment funds) are also a subject of intense research in terms of both their performance during crisis periods and their impact on the real economy. These funds provide investors with sensitive portfolios while ensuring capital flows to the green economy by transferring capital to companies that meet environmental and social criteria. Nofsinger and Varma (2014) found that socially responsible equity funds lost less value during the 2008 financial crisis compared to traditional funds with similar risk levels. This result indicates that sustainable investment funds can limit downside risks during crisis periods. Similarly, during the 2020 COVID-19 market shock, investor interest in ESG-focused funds remained relatively stable, and these funds tended to outperform the market during the recovery process. On the other hand, some studies note that in normal times, the returns of sustainable funds are not very different from those of traditional funds, and may even lag behind somewhat in non-crisis periods (Nofsinger & Varma, 2014). In light of these findings, the literature emphasises that sustainable finance instruments can provide an additional layer of resilience to the financial system during crises, but their long-term performance depends on market conditions.

The most recent empirical studies continue to confirm the structural resilience of green bonds and ESG-focused funds under market shocks and extreme uncertainty. For instance, recent research analyzing the performance of green bonds during periods of climate and economic uncertainty reveals that green bond portfolios exhibit superior resilience and risk-adjusted performance compared to both conventional and fossil-fuel-based ('black') bonds (Silva et al., 2024). This indicates that investors increasingly position green bonds as a structural safe haven during crisis periods. Similarly, new empirical analyses from 2025 investigating the asymmetric behavior of returns in green investments demonstrate that green financial instruments provide a significant hedging capability against downside market risks, maintaining their value better than traditional assets during periods of high volatility (Rehman et al., 2025). Research investigating specific regions, such as the MENA area, also reveals that during periods of crisis, firms cling more tightly to corporate social responsibility (CSR) and ESG mechanisms to maintain their competitiveness, with green performance acting as a critical mediator that enhances long-term resilience (Ben Romdhane & Kashif, 2026). These recent findings clearly support the argument that in crisis environments, sustainable finance instruments are not merely a recovery option, but a critical risk management tool that reconciles economic efficiency with environmental protection.

3.3. Post-Crisis Economic Recovery and Sustainable Finance:

The nature of policies implemented following financial crises determines the speed and quality of economic recovery. The literature emphasises that adopting sustainable financial policies in the post-crisis period supports economic recovery while ensuring future resilience. Following the 2008–09 global financial crisis, many countries allocated a portion of their recovery packages to green investments. A global assessment shows that approximately one-sixth of the stimulus packages announced during this period were allocated to broadly "green" measures (Jaeger *et al*., 2020). For example, public funds channelled into areas such as renewable energy, energy efficiency, clean transport and similar sectors have both created jobs and boosted demand in the short term, while also laying the foundations for more sustainable sectors in the long term (Jaeger *et al*., 2020). Green investment spending has been seen to support recovery, create tens of thousands of new jobs, and in some cases encourage innovation in clean technology sectors, particularly in economies such as the United States, the European Union, China, and South Korea (Jaeger *et al*., 2020). However, there are also cautious assessments regarding the sustainability and effectiveness of the green incentives implemented after the crisis. Although there was a temporary decline in global carbon emissions during the 2008-09 recession, emissions rose rapidly again with the economic recovery. This situation indicates that the post-crisis recovery needs to be supported by structural reforms to be sustainable (Jaeger *et al*., 2020). Therefore, it is considered critical that the steps taken after the financial crisis are aligned with climate change and sustainable development goals, both to increase economic resilience and to reduce long-term risks. Otherwise, financial crises can increase countries' vulnerability to climate change in the short term (Jalles, 2024). Indeed, Jalles (2024) found that countries experienced a significant decline in their climate shock resilience indices following a financial crisis, with this effect being particularly strong in developing countries. Therefore, following more recent crises such as that of 2020, the concept of "green recovery" has emerged, raising expectations that sustainable finance policies will accelerate economic recovery while supporting environmental goals. In general, the literature emphasises that directing recovery towards a post-crisis "build back better" approach

through sustainable finance will create both a more stable economy and a greener growth path in the long term.

3.4. The Relationship Between Financial Markets and the Green Economy:

Another theme emphasised in the literature is that financial markets are both an accelerator and a reflection of the transition to a green economy. With investors becoming more sensitive to environmental and social issues, sustainable investments have begun to gain significant ground in capital markets. Over the past decade, global ESG-focused investment funds and green bond issuances have grown rapidly, indicating an increased role for financial markets in sustainable growth. Numerous studies have found a positive relationship between companies' sustainability performance and their market value or financial returns. A large-scale meta-analysis has revealed that companies adopting sustainability criteria generally have similar or better financial performance, particularly achieving superior risk-adjusted returns in the long term (Friede et al., 2015). This indicates that markets can reward sustainable business models. Indeed, it is argued that companies with good ESG scores may have lower capital costs because investors perceive them as less risky in the long term. On the other hand, while financial markets are rapidly adapting to the green economy, there are still some challenges regarding the financing of sustainable growth. The prices of green assets can also be affected by general market fluctuations, and investors may still turn to traditional "safe haven" assets during periods of uncertainty. A study on regional green stock indices has revealed that green economy indices across different continents can interact with each other through risk contagion during crisis periods (Gunay et al., 2022). This finding demonstrates that green financial assets are also integrated into the global market system and can exhibit synchronised movements. Nevertheless, it is noted that, as a general trend, financial markets are increasingly incorporating climate risk and sustainability opportunities into their pricing mechanisms. Factors such as companies' carbon footprint and climate policy developments affecting investment decisions and asset values reflect the importance market actors attach to the green transition. Consequently, the literature emphasises that financial markets play a critical role in sustainable growth, with the potential to channel capital towards green innovation, price risks, and make resource allocation environmentally efficient. Thanks to the stance of market actors and regulatory efforts, financial markets have become an important stakeholder in the transition to a green economy (Friede et al., 2015; Gunay et al., 2022).

4. Bibliographic Analysis

Throughout human history, knowledge has been accepted as the fundamental dynamic of both individual and societal development. Scientific studies, which stand out as the most reliable and systematic form of knowledge, have enabled humanity to make great strides throughout history. Auguste Comte defines science as the highest form of knowledge, drawing attention to the importance of scientific thought (Al, U. 2014). Today, developments in information and communication technologies are both accelerating access to information and making it more affordable. However, this development also increases the accumulation of information and brings with it the risk of information pollution. Therefore, rather than simply accessing information, it is more important to access accurate, up-to-date and reliable information and to be able to systematically analyse the data obtained.

Transforming information into meaningful results is possible not only by collecting it but also by classifying and analysing it appropriately. In this regard, bibliometric analysis, one of the methods used in the process of interpreting large data sets, aims to reveal the current state and development trends of research areas with objective criteria. Bibliometric analysis examines publications related to a scientific field in various dimensions, such as citation counts, authors, countries, institutions, publication types, and keywords, offering the opportunity to evaluate productivity levels, collaboration networks, and academic activities (Üstdiken & Pasadeos, 1993). It also stands out as a functional method for identifying research trends in a field, changes in subject headings, and gaps in the literature.

Bibliometric analysis is an analytical approach that evaluates the current state of a research field using quantitative and formal methods and facilitates the monitoring of academic trends through visualisation software. This method, which provides numerical indicators for evaluating research performance, is often confused with concepts such as scientometrics, webometrics, and informetrics; however, its primary purpose is to provide comprehensive data on academic productivity and collaboration structures in the relevant field (Dirik et al., 2023). This method allows for the determination of the productivity levels and strengths and weaknesses of countries, institutions, authors, and journals. At the same time, it has become increasingly important in recent years because it contributes to the establishment of a research framework prior to systematic literature reviews.

The concept of bibliometrics was first introduced by Alan Pritchard in 1969. Pritchard defines bibliometrics as the application of mathematical and statistical methods to analyse written communication in order to provide data on the processes of this communication and the developmental dynamics of a scientific discipline (Lawani, 1981). Although the term took shape in the second half of the 20th century, the origins of bibliometric analysis applications date back to earlier periods. Indeed, in 1917, Cole and Eales examined studies published between 1550 and 1860 in the field of comparative anatomy, revealing the development of this scientific discipline and presenting one of the first examples of a bibliometric approach (Okubo, 1997).

4.1. Purpose of the Study

The main objective of this research is to comprehensively examine the relationship between financial crises and sustainable finance through bibliometric analysis. The study aims to analyse the effects of sustainable finance instruments, particularly mechanisms such as green bonds, environmental-social-governance (ESG)-based investments, and carbon markets, on the financial system during periods of financial crisis.

In the research, publications obtained from the Web of Science database using the keywords "financial crises and sustainable finance" were evaluated using bibliometric methods; in this context, publication trends by year, the most productive authors, countries and institutions, and frequently used key concepts in the literature were systematically examined. Thus, it reveals how the interaction between financial crises and sustainable finance has taken shape at the academic level and how this relationship has evolved over time.

The study aims to reveal the potential of sustainable finance to maintain economic stability and support restructuring processes during crisis periods. In this regard, the findings are expected to contribute to policy design, investment strategies, and academic literature aimed at increasing the resilience of the financial system.

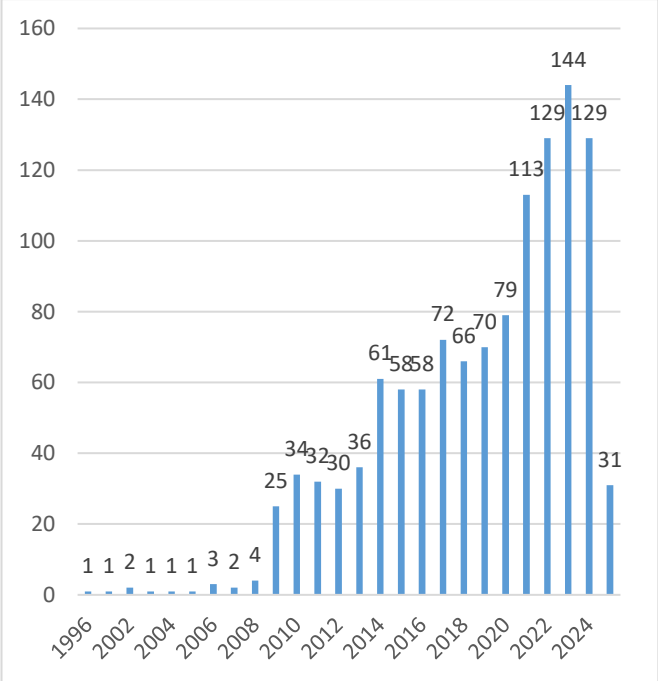
4.2. Methodology, Analysis, and Findings

The data used in this study were obtained by searching the Web of Science database using the keywords "financial crises and sustainable finance" under the "all fields" tab as of 14 April 2025. The analysis covers data from 1996 to 14 May 2025.

The Web of Science database was chosen for bibliometric analyses because it offers a comprehensive dataset, contains data from various disciplines, provides advanced search capabilities, has high scientific credibility, and is internationally recognised (Ateşçi and Dirik, 2024: 2223).

Figure 2

Distribution of Publication Numbers by Year

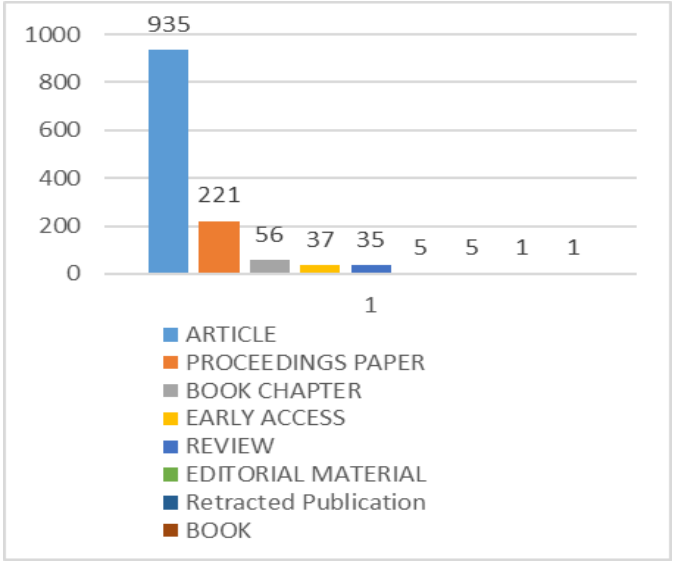


Source: Compiled by us from studies in the Web of Science database.

The Figure 2 examines the evolution of publication numbers between 1996 and 2025. Publication numbers remained limited between 1996 and 2007, averaging 4 publications per year. A marked increase was observed from 2008 onwards, with annual publication numbers varying between 25 and 36 between 2009 and 2013. Publication numbers remained between 58 and 61 between 2014 and 2016, with a relative stagnation during this period. After 2017, the upward trend continued, reaching 66 publications in 2018, 70 in 2019, and 79 in 2020. As of 2021, there has been a rapid increase, reaching 113 publications in 2021, 129 in 2022, and 144 in 2023. As of 2024, a decrease in the number of publications has been observed, falling back to 129. As of 2025, 31 publications have been made and this number is expected to increase by the end of the year. Overall, it can be said that academic interest in financial crises and sustainable finance has increased significantly since 2020, and research in this area has gained momentum.

Figure 3

By Document Type

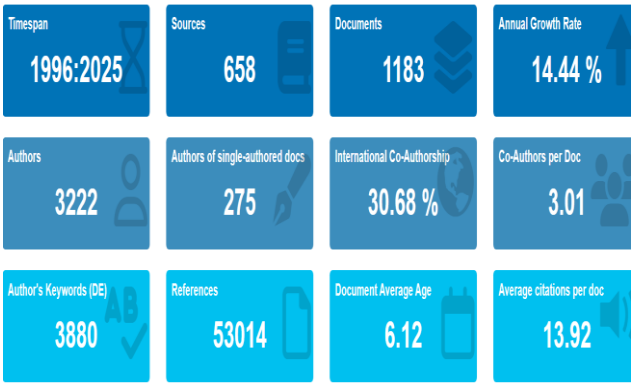


Source: Compiled by us from studies in the Web of Science database.

The type with the most publications is articles, with 935, which is the most defining publication type in the field. Conference proceedings rank second with 221 publications. Book chapters (56 publications), compilations (37 publications) and early access (35 publications) also occupy an important place. Editorial materials (5 publications) and retracted publications (5 publications) generally reflect corrections made after publication. Book (1 publication) and retraction (1 publication) types are less common and represent special cases.

Figure 4

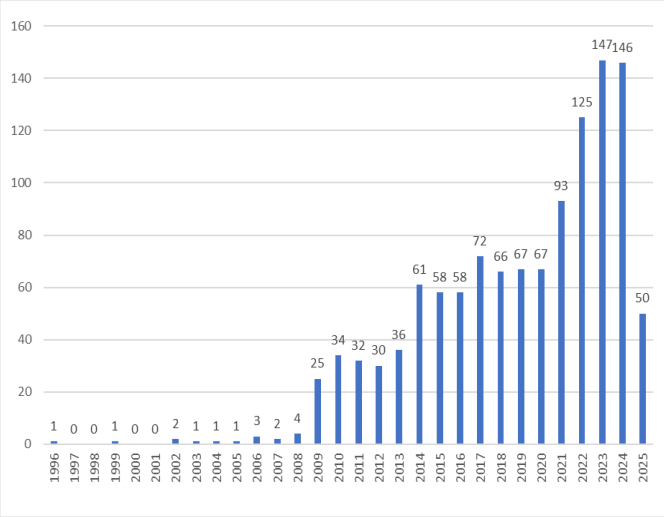
Key Information Related to the Research Topic



Source: Visualisation created by the author using RStudio based on the Web of Science database .

The results of the keyword-based search are shown in the Figure 4 above. A review of the relevant literature reveals that the first publication related to the topic was in 1996, while the most recent publication was in 2025. Within this framework, a total of 1,183 documents on the topic were found, and it was determined that these studies were published in 658 different academic journals. The annual publication growth rate is 14.44%. A total of 3,222 authors are listed in the studies reviewed; 275 of these are single authors. On average, each study is authored by 3.01 authors, and the average number of citations per article is calculated as 13.92. Furthermore, it is observed that each publication has an average history of 6.12 years.

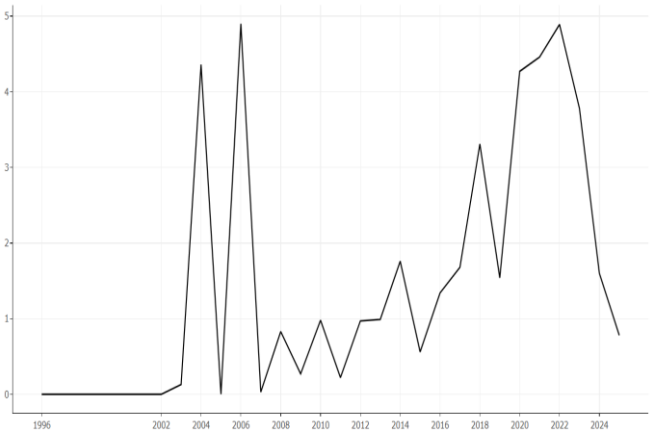
Figure 5
Annual Scientific Output



Source: Visualisation created by the author using RStudio based on data from the Web of Science database.

The data confirms the general upward trend in the number of publications between 1996 and 2025. The period after 2008 can be considered exceptional in terms of the number of publications. During this period, a marked increase in scientific production was observed due to the impact of the global financial crisis. For 2020 and beyond, significant increases in the number of publications were observed alongside the economic effects of the COVID-19 pandemic. For the first quarter of 2025, it can be said that there was a considerable number of publications.

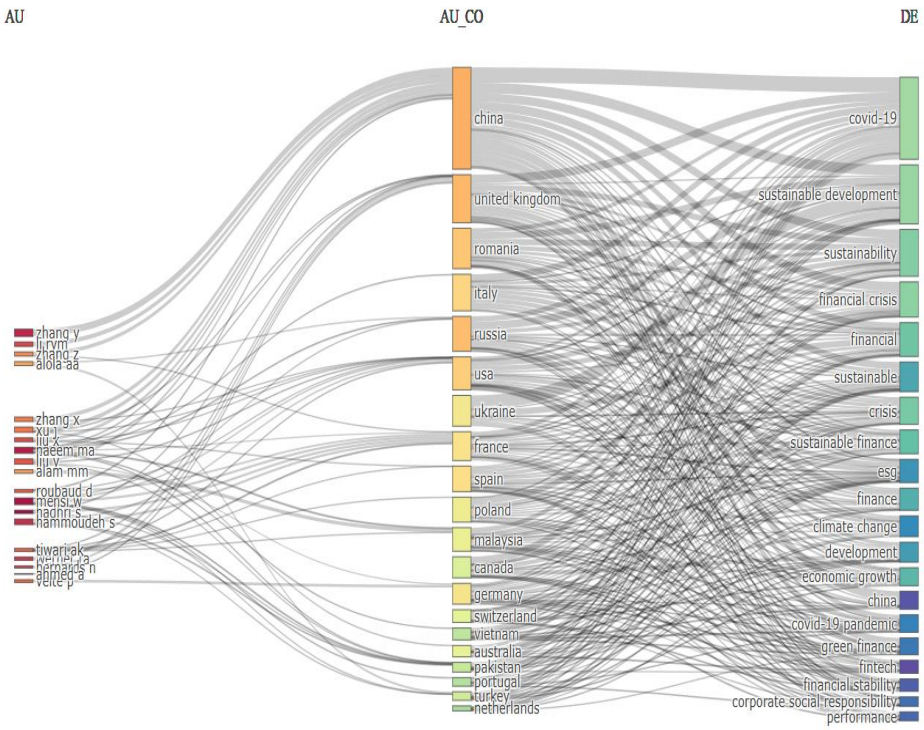
Figure 6
Annual Average Citation Count



Source: Visual created by the author using RStudio based on data from the Web of Science database.

The Figure 6 shows the annual average citation counts for publications on financial crises and sustainable finance. The data here indicates that citation counts, which measure academic impact, have increased, particularly since 2008. It is possible to say that the same increase occurred in publications from 2020 onwards. This may indicate that articles written during this period are of strong academic interest. However, a slight decline in citation counts can be observed in 2024. Data for 2025 is currently limited.

Figure 7
Relationship between Countries, Authors, and Keywords

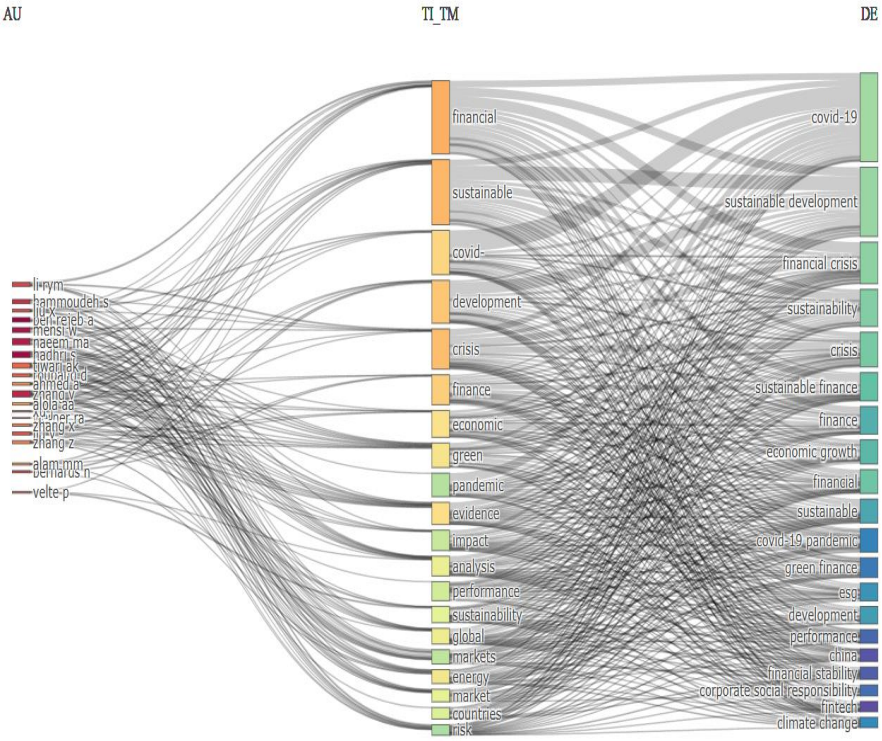


Source: Visualisation created by the author using RStudio based on data from the Web of Science database.
AU_CO: Author Country, AU: Author, DE: Keyword
The Figure 7 visualises the relationships between the components of author country (AU_CO), author (AU), and keyword (DE).

It shows that countries such as China, the United States of America (USA), and the United Kingdom (UK) have high connection densities. This indicates that academic production in the fields of financial crises and sustainable finance is largely concentrated in these countries. Furthermore, concepts such as "Sustainable Development", "Financial Crisis", "Green Finance", "**ESG"** and "COVID-19" stand out; these themes are understood to represent the main areas of research in the literature.

Figure 8

Relationship between Authors, Subject Headings, and Keywords

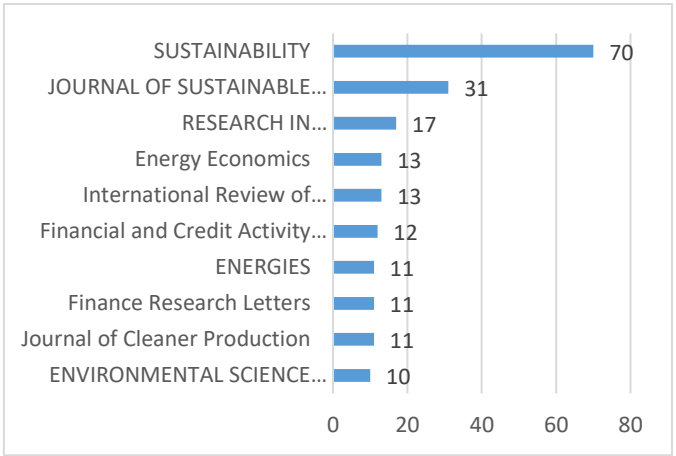


Source: Visualisation created by the author using RStudio based on data from the Web of Science database.
TI_TM: Words Appearing in Topic Headings, DE: Keyword, AU: Author.

When examining the densities in the Figure 8, it can be seen that the connections are concentrated around certain concepts. In the TI_TM (Words Appearing in Subject Headings) column, the terms "sustainability", "Covid-19", "finance" and "crisis" have high connection densities. This indicates that these concepts are addressed by multiple authors and form common thematic intersections between different studies. In the DE (Keyword) column, concepts such as "sustainable finance", "economic growth", "green economy" and "crisis management" are observed to form dense connections. This finding reveals that the themes prominent in the subject headings are also repeated at the keyword level and that the studies are grouped around specific thematic axes. In the AU (Author) column, it is seen that some authors are associated with a large number of concepts and keywords. These authors stand out as researchers who conduct multidisciplinary studies in the literature and establish connections between different themes. The density distributions reveal an increasing research interest in the literature on sustainability and Covid-19; these themes are strongly linked to areas such as fiscal policy, crisis management, and the green economy.

Figure 9

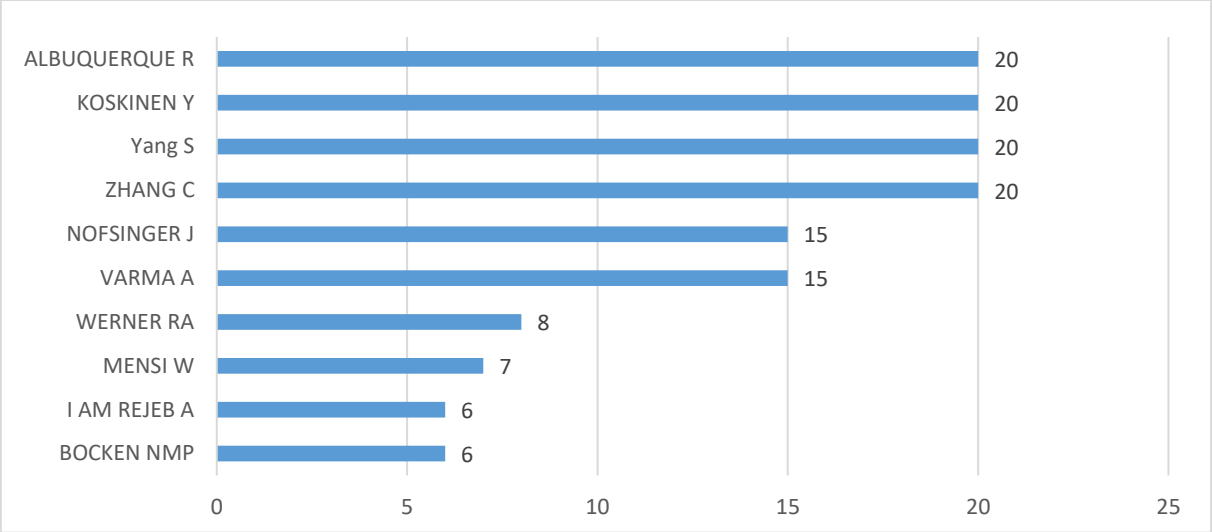
Number of Articles Published by Journal



Source: Visual created by the author using RStudio based on the Web of Science database

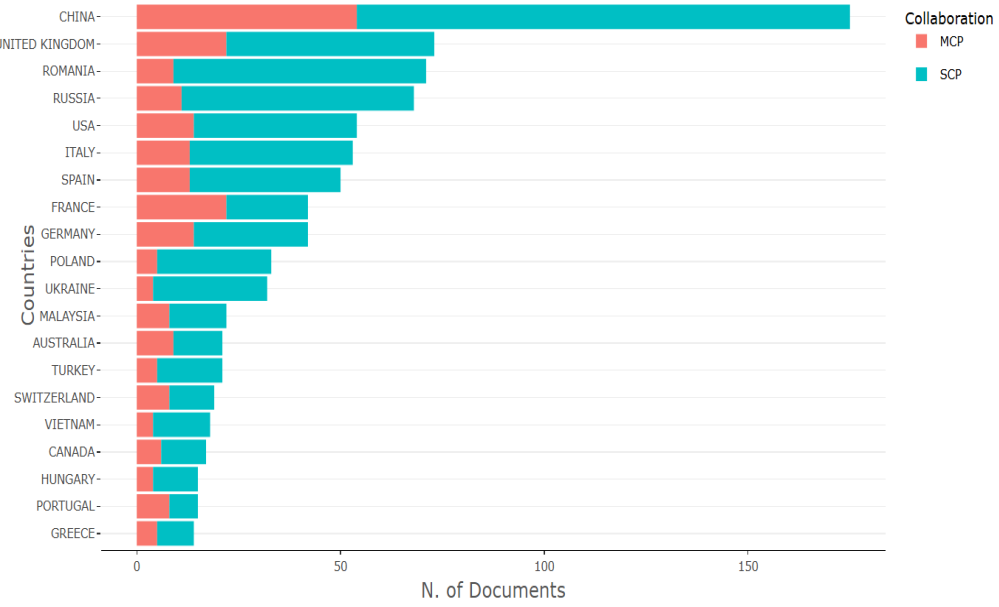
The journal with the highest number of publications is Sustainability (70). The journal with the lowest number of publications is Environment Science and Pollution Research (10).

Figure 10
Authors with the Most Citations



Source: Visualisation created by the author using RStudio based on data from the Web of Science database.
The top four authors with the most citations (20) in this field were Albuquerque R, Koskinen Y, Yang S, and Zhang Ce. The authors with the fewest citations (6) were Ben Rejeb A and Bocken NMP.

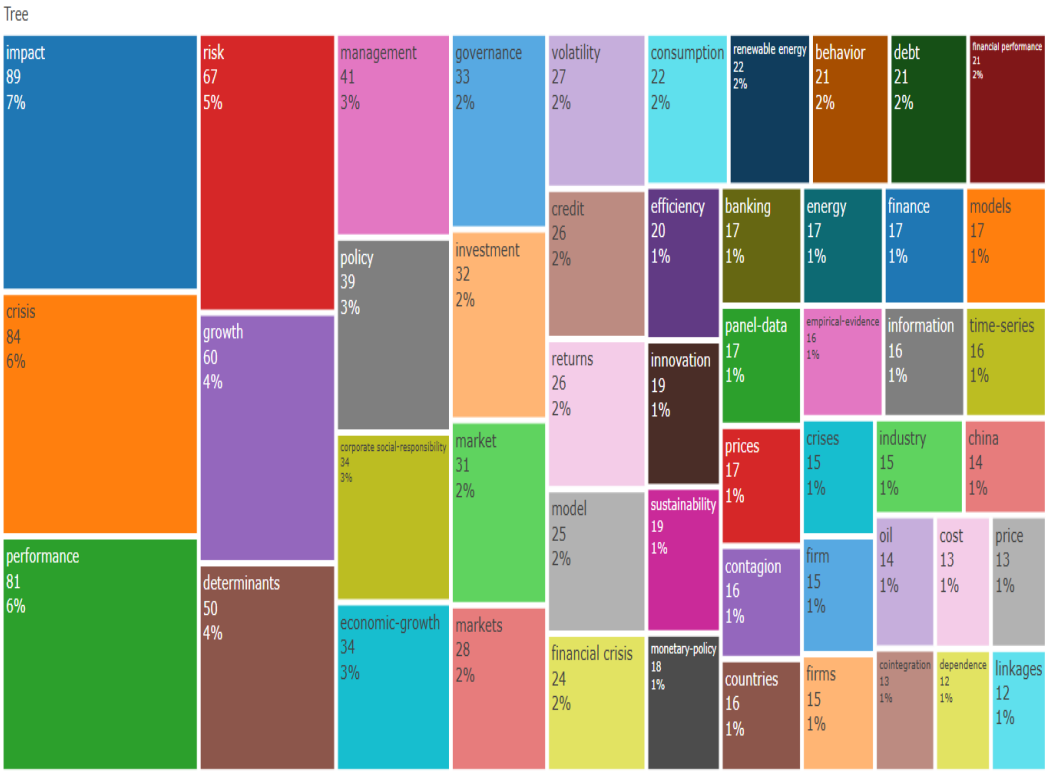
Figure 11
Countries of Corresponding Authors



Source: Visualisation created by the author using RStudio based on data from the Web of Science database.

In terms of responsible authors, China ranks first with 121 multi-authored and 54 single-authored articles. The United Kingdom ranks second with 51 multi-authored and 22 single-authored articles, while Romania ranks third with 62 multi-authored and 9 single-authored articles.

Figure 12
Tree Map of Keywords Selected by Authors (Number and %)



Source: Visualisation created by the author using RStudio based on data from the Web of Science database.

The Figure 12 shows the top 50 keywords selected by the authors. Accordingly, the frequency and percentage distribution of the words used are visualised in a tree map format. According to the data, the keywords 'sustainable development', 'financial crisis', 'green finance', 'ESG' and 'COVID-19' are frequently used, indicating their prevalence in the literature. The percentage distribution of keywords reveals that these concepts form the dominant points in the research and that sustainable finance instruments come to the fore, especially during times of crisis. The least frequently used words are "cost," "price," "cointegration," "dependence," and "connections."

Figure 13
Cloud of Keywords Selected by Authors

Source: Visualisation created by the author using RStudio based on the Web of Science database.
The top five keywords used by authors in the article are, in order, impact (89), crisis (84), performance (81), risk (67), and growth (60).

5. Conclusion

This study examines the academic literature on financial crises and sustainable finance using bibliometric analysis methods and aims to reveal the interaction between these two fields. Publications obtained from the Web of Science database were evaluated using R Studio analysis tools, and academic collaborations, keyword densities, and citation structures were visualised.

The findings reveal a marked increase in academic interest in sustainable finance following financial crises. Particularly after the 2008 Global Financial Crisis and the COVID-19 pandemic, sustainable finance instruments have gained prominence in crisis management and economic recovery processes (Flammer, 2021; Jaeger et al., 2020). Findings indicating that investments based on ESG (environmental, social, and governance) criteria are more resilient to crises and have increased appeal for investors are frequently cited in the literature (Lins et al., 2017; Nofsinger & Varma, 2014).

Bibliometric data reveals that the highest number of publications on financial crises and sustainable finance originate from the United States, China, and European countries. Considering the influence of these countries on the global financial system, this trend appears meaningful. Furthermore, it is noteworthy that interest in sustainable finance has increased in recent years in developing countries such as Turkey, Malaysia, and Pakistan.

Keyword analyses show that concepts such as "sustainable development," "financial crisis," "COVID-19," "green finance," and "renewable energy" are frequently used in the literature. This indicates that sustainable finance, along with its environmental and social dimensions, has begun to play an important role in ensuring economic stability during times of crisis. It is observed that instruments such as green bonds, carbon markets, and ethical investments have increasingly become the subject of research in post-crisis recovery processes (Friede et al., 2015; Gunay et al., 2022).

In this context, future studies on the relationship between sustainable finance and financial crises are expected to contribute to deepening the existing body of knowledge. Some gaps highlighted in the literature can be addressed under the following headings as suggestions:

- The long-term crisis resilience of sustainable finance instruments has not yet been sufficiently clarified. In particular, how green bonds and ESG funds perform in volatile market conditions could be the subject of further empirical studies (Flammer, 2021; Koch et al., 2014).
- How carbon pricing systems respond during economic crises and strategies to make these systems more resilient could constitute new areas of research.
- The sustainability of the effects of green stimulus packages announced after the crisis and their contribution to environmental sustainability goals have not yet been fully assessed (Jalles, 2024). The extent to which these policies contribute to structural transformations could be examined in future studies.
- The role of central banks and international financial institutions in sustainable finance policies can be examined in greater detail in the context of crisis periods.
- Investors' approach to green finance instruments during crisis periods and the correlation between these instruments and traditional financial products can be assessed through more comprehensive analyses (Gunay et al., 2022).
- Sustainable finance practices are mostly addressed in developed economies. The relationship between practices in developing countries and regulatory structures, and their responses to crises, could be a separate research topic.
- The intersection of digital finance technologies (fintech) and sustainable finance is becoming increasingly important. Blockchain-based green bonds and decentralised finance (DeFi) applications are among the innovative areas that can be examined in this context.
- Regulatory authorities must establish globally consistent and transparent standards for ESG reporting and green financial instruments. This standardization is crucial to prevent 'greenwashing' and to sustain investor confidence during periods of high market volatility.
- Central banks and financial regulators should formally integrate climate-related and environmental risks into their macroprudential oversight and systemic stress-testing frameworks, recognizing that ecological vulnerabilities can directly precipitate financial instability.
- Governments designing post-crisis stimulus packages should implement strict conditionality, linking financial support and corporate bailouts to verifiable sustainability commitments. This ensures that recovery funds facilitate a structural transition to a low-carbon economy rather than reinforcing carbon-intensive practices.
- To address the disparities between developed and developing economies highlighted in the literature, international financial institutions must provide targeted technical and financial assistance. Building robust sustainable finance ecosystems in these vulnerable regions is essential for global economic resilience.
- Policymakers should create comprehensive "regulatory sandboxes" and frameworks for blockchain-based green assets and decentralised finance (DeFi) applications. This approach will foster technological innovation while ensuring energy efficiency, market transparency, and the mitigation of systemic risks.

In conclusion, the relationship between financial crises and sustainable finance is addressed in a multidimensional manner in the literature, and interest in this area is expected to continue to grow in the future. Interdisciplinary studies on this topic can contribute to making the financial system more resilient, inclusive, and environmentally sustainable.

To further advance the understanding of the interaction between financial crises and sustainable finance, several areas are recommended for future investigation. First, future research could transition from a general bibliometric mapping to deep-dive empirical studies focusing on how sustainable finance instruments mitigate crisis impacts within specific high-emission industries, such as energy, manufacturing, or transportation. Second, while this study utilizes bibliometric methods to map research trends, future studies are encouraged to employ meta-analyses or systematic literature reviews to provide a quantitative synthesis of the actual financial performance of ESG assets during market downturns. Third, a comparative analysis exploring how different regional regulations—such as the EU Taxonomy, the Sustainable Finance Disclosure Regulation (SFDR), or emerging Asian green frameworks—influence sustainable investment flows and resilience during global crises would provide valuable insights for policymakers. Furthermore, researchers could undertake longitudinal studies to track the evolution and stability of the "green premium" (greenium) across multiple economic cycles to determine if its risk-mitigation benefits hold steady during prolonged recessions. Finally, further investigations into the intersection of financial technologies (Fintech) and sustainable finance, specifically examining how artificial intelligence-driven ESG monitoring and blockchain transparency affect financial stability during crises, represent a promising frontier for the literature.

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