sustainability

MDPI

Article

Supply Chain Finance: A Research Review and Prospects Based on a Systematic Literature Analysis from a Financial Ecology Perspective

Lele Zhou, Maowei Chen and Hyangsook Lee *

Graduate School of Logistics, Incheon National University, Incheon 22012, Korea
* Correspondence: hslee14@inu.ac.kr

Abstract: Since the global financial crisis of 2008, research on supply chain finance (SCF) based on supply chain management (SCM) has increased rapidly. The context of SCF development is continuously changing, which means that it cannot function in isolation and financial ecology must be taken into consideration. Previous research has shown that comprehensive SCF studies incorporating financial ecology are lacking; although it was mentioned, it was at a descriptive level with fragmented dimensions, limiting the broader understanding of SCF. Therefore, to address this research gap and reveal future study prospects, we conducted a systematic literature search, focusing on 132 selected papers published between 2002 and February 2022. The present study provides insights into the development stages of SCF, and the understanding of 'Supply Chain' and 'Finance' in the context of the financial ecosystem. This study reiterates the necessity of studying SCF from a financial ecology perspective and contributes to the SCF ecosystem understanding framework, bridging the theoretical inadequacies in investigating SCF.

Keywords: supply chain finance (SCF); supply chain management (SCM); systematic literature review; financial ecology/ecosystem

Citation: Zhou, L.; Chen, M.; Lee, H. Supply Chain Finance: A Research Review and Prospects Based on a Systematic Literature Analysis from a Financial Ecology Perspective. *Sustainability* **2022**, *14*, 14452. https://doi.org/10.3390/su142114452

Academic Editor: Sungyong Choi

Received: 31 August 2022
Accepted: 31 October 2022
Published: 3 November 2022

1. Introduction

1.1. Conceptual Background

Supply chain finance (SCF) appears to be a new concept compared to traditional financing methods, and has become a hot research topic in supply chain (SC) and supply chain management (SCM) study in recent years [1]. The history of SCF dates back to the 1970s. The majority of early studies on SCF were conducted from the standpoints of trade credit and inventory. Previous researchers, such as Budin and Eapen [2], noted that net cash flow occurs through corporate activities throughout the cash planning phase. Factors such as trade credit and inventory may have an impact on net inflows. Furthermore, Haley and Higgins [3] highlighted the link between trade credit and inventory policy. However, Wood [4] stated that, in the early stages, financial research is primarily based on the economic characteristics of a single company.

However, the idea of SCF was not fully established until the early 2000s. According to Stemmler [5], a key aspect of SCF is the integration of financial flows into the physical supply chain (PSC), and SCF can be characterized as a critical component of SCM. Similarly, Hofmann [6] discovered that SCF exists at the interface of logistics, SCM, and finance. Moreover, two or more parties in an SC jointly produce value (including internal and external SC players), and the financial resources flow is managed on an inter-organizational level.

Subsequently, the global financial crisis fueled the growth of SCF in 2008. More than a million companies around the world declared bankruptcy as a consequence of the broken capital chain caused by the reaction of the enterprises' financial collapse in the SC; 13% of organizations in a 2008 survey claimed that the deterioration of their key suppliers' financial standing had induced SC disruptions [7]. As a result, it increases

the urgent demand for solutions and programs to optimize working capital from SC and drives the emergence of SCF as a collection of solutions, programs, and technologies [8] that support financial optimization in SC 'from start to finish' [9] to address any funding difficulties that may be encountered by numerous SC actors (SMEs) [10]. Consequently, this in turn, attracted the attention of many institutions and researchers. The majority of SCF research in this period has concentrated on optimization [11–13], integration [14], cost reduction [13,15], and value creation [6,16,17]. A few of the most common definitions of SCF are summarized here. Camerinelli [12] proposed that SCF benefits the capital flows optimization and liquidity value modification by offering various products or services to facilitate the management of physical and information flows by financial institutions in the SC. Pfohl and Gomm [14] defined SCF as the intracompany optimization of financing by integrating financing processes with customers, suppliers, and service providers to increase the value of all participating companies. The Supply Chain Finance Community [11], a nonprofit organization, also pointed out that SCF covers a range of approaches and instruments that optimize those extended SC's transactions, working capital, and costs. Petr et al. [15] recognized that SCF seems like a fundamental way to solve capital flow obstruction, thus optimizing capital flow in the SC.

Obviously, it is not difficult to discover that the SCF has entered a rapid development phase since 2008. To illustrate the development of SCF, we selected six representative and relatively frequently cited SCF-related studies (see Table 1).

Table 1. Six Selected Representative Literature Reviews with the Main SCF Research Points.

Author, Yr.	Paper Title	Number of Quotes	Main Research Points
Camerinelli 2009	Supply Chain Finance	128	Demonstrates the function of financial components as a 'glue' in the SC from the perspective of financial flow innovation by banks and financial institutions.
Pfohl and Gomm 2009	Supply Chain Finance: Optimising Financial Flows in Supply Chains	446	Proposes an SCF mathematical model with three dimensions of the trigger, actor, and levers to detect the role of financial flows in SC and the effects SCM can have on optimizing such flows in terms of capital cost.
D. Seifert et al., 2013	A Review of Trade Credit Literature: Opportunities for Research in Operations	327	Reviews SCF based on the literature of trade credit.
Gelsomino et al., 2016	Supply Chain Finance: a Literature Review	196	Identifies the SCF business model from two perspectives: Financial-oriented and Supply Chain-oriented.
X. Xu et al., 2018	Supply Chain Finance: a Systematic Literature Review and Bibliometric Analysis	284	Conducts SCF research from four clusters of 'the deteriorating inventory model under trade credit policy', 'the inventory decisions made with trade credit policy', 'the interaction between replenishment decisions and delay payment strategies' and 'the roles of financing service in the supply chain'.
Jia et al., 2020b	Towards an Integrated Conceptual Framework of Supply Chain Finance: an Information Processing Perspective	94	Expands existing SCF business model into four types of 'manufacturer-centred model', 'bank-centred model', '3PL-centered model' and 'supply chain actor-centred model'.

1.2. Research Aims and Questions

Previous research has also revealed that, although SCF has been extensively studied in terms of its operational and financial aspects, such as function, solutions, players, collaborations, technologies, regulations, and performance, the research still remains fragmented. Furthermore, while the six studies in Table 1 provide some inside knowledge of SCF, this is still at the descriptive level regarding certain specific components of SCF. In other words, gaining a deeper understanding of SCF by theoretical explanation is insufficient. This issue, as stated by Gelsomino et al. [18], X. Xu et al. [19], and C. Bals [20], leads to an imbalance between SCF theory and practice, which affects SCF research.

Simultaneously, there seem to be few SCF studies involving financial ecology. Shen et al. [1] mentioned that there are only a few papers focused on how to enhance the SCF model from the viewpoint of financial ecology. Financial ecology, a theory based on a natural ecosystem, was proposed by a British ecologist named A.G. Tansley [21]. Moore [22] defined a business ecosystem as co-evolving capabilities around connectivity and innovation with four evolutionary stages of birth, expansion, leadership, and self-renewal inspired by an organic ecosystem. Furthermore, Wang and Yang [23] suggested that a financial system contains group ecological traits such as an internal logical arrangement and development rule—it has developed an ordered structure in economic activities with distinct structural and functional properties. This ordered structure could be viewed as financial ecology. Zhou [24] and Xu [25] investigated the economic ecology from two different perspectives: a financial environment and a financial system. For the financial environment, Zhou [24], the previous governor of the People's Bank of China, said that it typically refers to social laws and regulations, accounting standards, social credit, enterprise reform, government enterprise relationships, and bank enterprise relationships, etc. Focusing on the financial system, Xu [25] stated that financial ecology relates to the dynamic balance formed by the division of labor and cooperation between financial organizations. Moreover, Mizgier [26], Wei [27], Pellegrino et al. [28], and Shen et al. [1] all agreed that the developing environment is constantly changing, and SCF cannot function in isolation, implying that the SCF ecosystem is a complete ecological circle, or a so-called dynamic equilibrium system, influenced by the participants and the ecological environment.

More and more scholars are becoming aware of financial ecology and trying to incorporate it into their studies of SCF. Scholtens [29] pointed out that both finance and ecology cannot be ignored. Shen et al. [1] believed that regarding SCF as an ecosystem and comparing COs (core organizations), financial institutes, and logistics in the SC as parts of an ecosystem can assist with analyzing relationships among SC actors and creating a broader vision for research. Namely, adopting the concept of financial ecosystems into SCF may promote a broader understanding of SC participants, interconnection, and SCF transition from theory to reality. However, little of the existing research on SCF helps provide a literal representation of the financial ecosystem. Even the individual articles mentioned, including the systematic review by C. Bals [20], who based it on the concept of the business ecosystem put forward by Moore [22] and first introduced it into the SCF sector, the research related to financial ecology is somewhat limited and descriptive. Aside from the metaphor of the SC as a financial ecosystem, most studies have approached financial ecology and SCF from a relatively one-sided perspective such as financial ecology modeling, relationship synergy, energy flow, environment, or regulation. There is relatively inadequate systematic research on the financial ecological vision.

Thus, to address research gaps, this paper attempts to construct a more comprehensive SCF-related systematic literature review based on a financial ecological vision to explore the SCF development lineage, terminology, current research, and implementation, including some potential future research agendas, and further carry out an SCF ecosystem understanding framework as well as make the potential contributions to fill the theoretical inadequacies in SCF study. In addition, for carrying out a more thorough study, this paper regards financial ecology as an economic ecosystem, as mentioned by Xu [25], Mizgier [26], Wei [27], Pellegrino et al. [28], and Shen et al. [1]. Our two research questions are as fol-

lows: Question 1: How many stages of SCF development have been experienced? And Question 2: How are the terms 'Supply Chain' and 'Finance' understood in the context of financial ecology?

1.3. Paper Layout

After the introduction, Section 2 covers the methodology. This part introduces the method of a systematic literature review with detailed guidance on the process. Following this, in Section 3, a detailed literature collection and evaluation with data extraction is conducted with 132 selected journal papers collected from 2002 to 2022 (February) for further research. Subsequently, Section 4 comprises the data integration and analysis (conceptual development descriptive and content analysis) around two research questions posed earlier. Following this Section 5 present the discussion, Section 6 the future research, and Section 7 draws the conclusions.

2. Methodology

2.1. Systematic Literature Review

The main methodology adopted in this paper is a systematic literature review with a concept description and content analysis. The systematic literature review is different from a traditional literature review. Methodology experts [30,31] have classified the literature review into narrative and systematic. The narrative literature review can also be grouped into a descriptive literature review and a critical descriptive literature review. Some scholars [32] pointed out that the above two types of narrative literature reviews are traditional styles, while the remaining one is the newly systematic literature review.

The systematic literature review should be open-minded, transparent, explicit, comprehensive, auditable, and reproducible [33–36]. It is not simply a collection or summary of other papers; it should have reasons and detailed methods to show how the research topic is chosen and how the study's aim is transferred throughout the author's research. A 'systematic review' is a kind of qualitative method [36] of searching and selecting all relevant literature thoroughly using an electronic database, with standardized and structured technology to evaluate the chosen literature quality carefully.

2.2. Systematic Literature Review Conducting Procedure

For conducting the systematic literature review, different scholars suggest various methodologies with different specific steps. Denyer and Tranfield [35] divided the systematic literature review method into the following steps: 'questions formulation', 'locating studies', 'study selection and evaluation', 'analysis and synthesis', and 'reporting'. Other researchers [32] designed systematic literature review procedures (see Table 2) in six steps: (1) Make a research plan; (2) Search for literature review; (3) Literature evaluation; (4) Data extraction; (5) Data integration and discussion; and (6) Summary of a write-up. Both processes mentioned above contain the critical links of a systematic literature review. However, the approach mentioned by Jesson et al. [32] seems more feasible and precise. It integrates the whole technology of research problems and strategies in the 'plan' stage, separating the literature evaluation and data synthesis (e.g., extraction, integration, analysis, and discussion) into two independent implementation steps and forming the link to review-written. In this paper, the primary process on conducting a systematic literature review would follow the methods that Jesson et al. [32] mentioned. Meanwhile, the flexible, transparent, systematic method of content analysis [36] would also be integrated based on different research questions to analytically study the contents [37] with conceptual development description analysis [38] for carrying out a clearer data synthesis.

Table 2. Systematic Literature Review Steps Suggested by Jesson et al. [32].

Steps	Goal	Main Task
Step 1	Make a research plan	Determine the research purpose, state the research questions, and introduce the research steps.
Step 2	Search for literature review	Find the most valuable literature for the research problems, and edit the retrieval process into the document. The contents include the names of the databases used (two or more), the date of retrieval, the starting and ending years of literature, the terms or keywords used, the languages, and the number of articles retrieved.
Step 3	Literature evaluation	The primary purpose of the retrieved literature quality evaluation is to set criteria to include or exclude the literature and ensure the validity and reliability of the data.
Step 4	Data extraction	Various data extraction forms, such as 'document basic information data extraction sheet' and 'literature connotation data extraction sheet', are developed on Excel and other software to reduce human errors and biases.
Step 5	Data integration and discussion	The differences and connections between the data are found according to the data extraction list, and appropriate analysis methods (e.g., description analysis, content analysis) are further used to explore the data's knowledge and answer different research questions.
Step 6	Summary of a write-up	Summarize a write-up, including an introduction, research background, study methodology, data extraction process, data integration results, discussion, and conclusion.

3. Literature Collection, Evaluation and Data Extraction

This paper's comprehensive systematic literature review flow combining the six processes identified by Jesson et al. [32] is presented in Figure 1 below. In this paper's context, step 1 of making a research plan based on research questions from the perspective of financial ecology has been mentioned in Section 1.2, and is, therefore, not discussed further in this section. In addition, to better fit the logical structural line of this paper, among the other five steps, step 2 to 4 are integrated into Section 3 of literature collection, extraction, and data extraction. Step 5 is divided into Section 4 with the data integration and analysis, and Section 5 with the discussion. Finally, step 6 of the write-up summary can be mirrored in the overall writing of this article.

3.1. Literature Review Search

Following the definition of SCF proposed by Gelsomino et al. [18], X. Xu et al. [19], and Jia et al. [39], the understanding of SCF is from the two aspects of 'Supply Chain' and 'Finance'. The SCF probably exists at the intersection part of 'Supply Chain' and 'Finance'. Thus, the keywords used in the search should be related to the two factors mentioned above. In general, the keywords under 'Supply Chain' refers to 'Supply Chain Management/SCM', 'Supply Chain Coordination/SCC', 'Logistics', 'Procurement', 'Manufacturing', 'Inventory', and so on. While for the 'Finance' part, the keywords involve 'Financing', 'Finance Solutions', 'Working Capital', 'Capital Flow', 'Cash Flow', 'Cash Conversion Cycle', 'Capital Constraint', 'Delay/Delayed Payment', 'Advance/Advanced Payment', 'Inventory Pledge', and 'Factoring/Reverse Factoring', etc. Although the combination of both parts' keywords presents a variety of textual expressions, such as 'Supply Chain Financ*', 'Financ* Supply Chain', 'Capital Supply Chain', and so on, this paper still regards 'Supply Chain Finance' as the most central keyword to reach the heart of the research topic.

Databases searched in this paper were 'Web of Science (WoS)', 'Scopus' and 'Google Scholar'. 'WoS' is the world's most trusted and publisher-independent citation database. 'Scopus' is a literature database that includes more than 5000 publishers in science, technology, medicine, and social science. 'Google Scholar' is the world's leading source for scientific, technical, medical, and social science research. When putting the most represen-

tative keyword of 'Supply Chain Finance' on the search box of each literature database of 'WoS', 'Scopus' and 'Google Scholar', the search data on 13 February 2022, showed that from 2002 to 2022, the related English language research papers and materials in 'WoS' were around 4608; in 'Scopus' were nearly 48,521; in 'Google Scholar' were approximately 722,000. However, when 'Supply Chain Finance' was used as the controlled continuous fixed vocabulary keyword for directly pinpointing the article's major themes [32], the search results were changed. 'WoS' had 505, 'Scopus' had 2076, and 'Google Scholar' had 7700. The documents retrieved here include articles, conference papers, book chapters, reviews, books, etc.

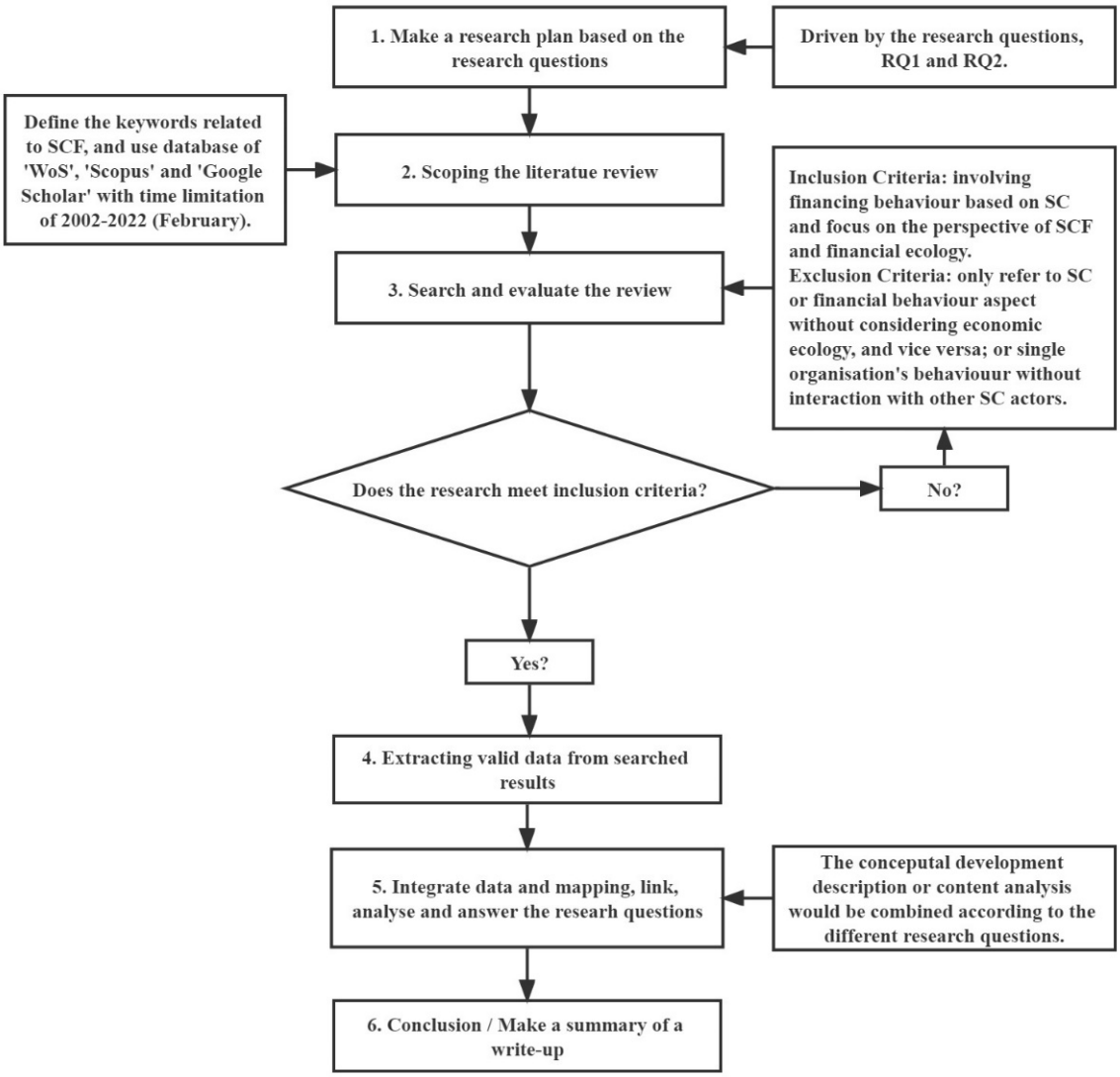

Figure 1. Flow Chart of the Systematic Literature Review.

3.2. Literature Evaluation

The trend graph (Figure 2) below is obtained from the 'Scopus' database, demonstrating that the phrase 'Supply Chain Finance' initially appeared as an inherent term in 2006. The number of papers published with the fixed continuous keywords 'Supply Chain Finance' has increased from 4 in 2006 to 726 in 2021 and 170 at the current (13 February 2022). A growing pattern of research publications involving SCF also can be found in 'WoS' and 'Google Scholar'.

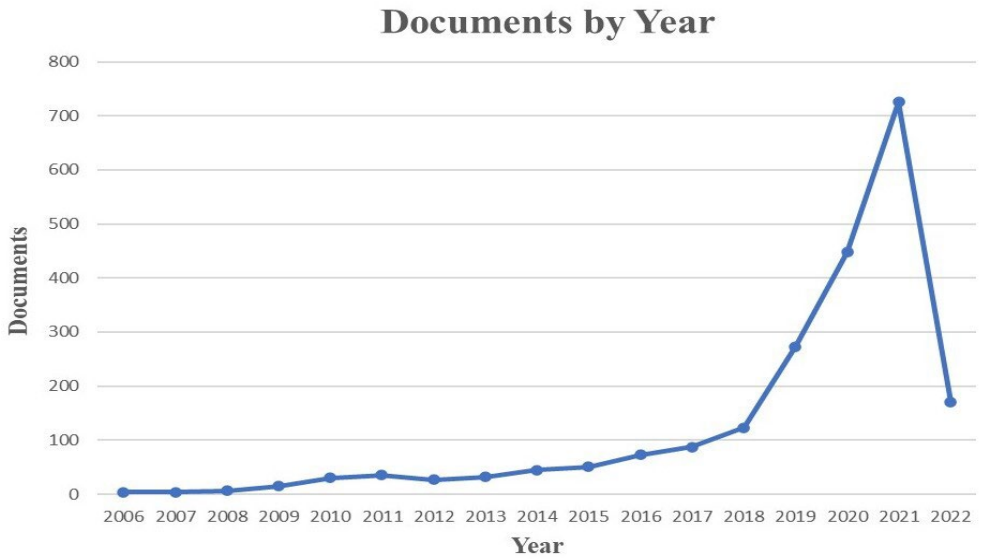

Figure 2. Continuous fixed-term 'Supply Chain Finance' related research from 2006 to 2022 (February) in Scopus.

Considering the subject area, as Figure 3 shows, the most fixed-terminology 'Supply Chain Finance' study area from 'Scopus' refers to the business, management and accounting (20.3%), following computer science (17.3%), engineering (16.3%), and decision sciences (12.5%).

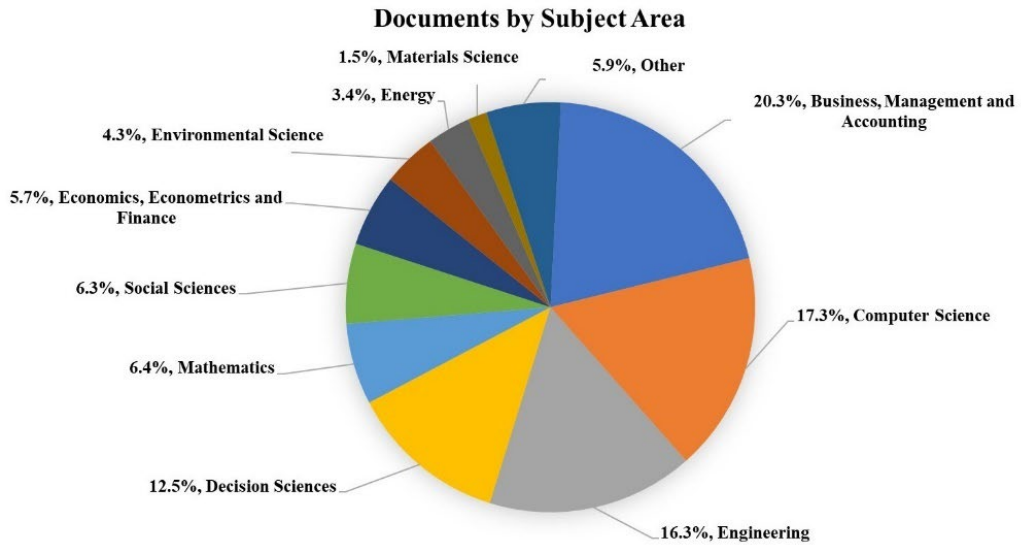

Figure 3. 'Supply Chain Finance' related documents by subject area from Scopus.

Similarly, data referring to the inherent words of 'Supply Chain Finance' from 'WoS' (Figure 4) illustrates that 153 papers come from the management category, 136 research papers are related to the operations-research-management-science category, followed by 89 papers based on the engineering-industrial category.

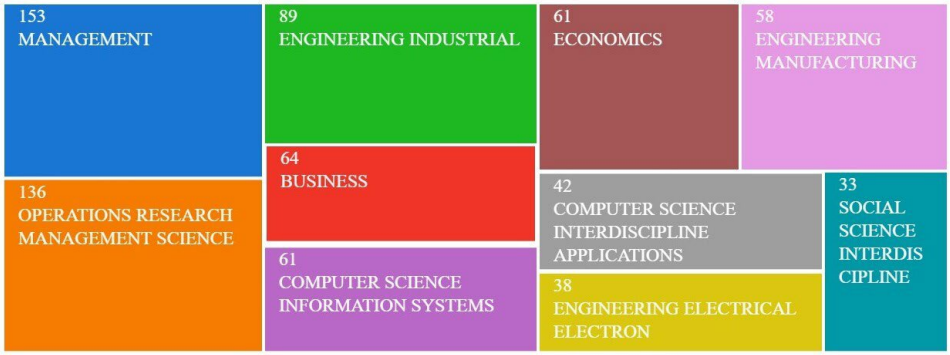

Figure 4. 'Supply Chain Finance' related articles divided by subject area from WoS.

3.3. Data Extraction

Prior to the data (literature) extraction, the scope of the literature with inclusion and exclusion criteria needs to be clarified. In this research, the inclusion criteria relate to SC-based financial behavior and emphasize both aspects of SCF and financial ecology. In contrast, the exclusion criteria imply that the resource corresponds to only one SC or financial behavior aspect without considering economic ecology, and vice versa. Furthermore, when the financing behavior is involved only in one single organization without concerning the interaction between SC actors and finance is also excluded.

Therefore, for narrowing the research topic based on both aspects of SCF and financial ecology/ecosystem, the search conditions are set to 'Supply Chain Finance' and 'Financ* Ecology/Ecosystem', or 'Supply Chain Finance' and 'Economic Ecology/Ecosystem', or 'Supply Chain Finance' and 'Business Ecology/Ecosystem'. Here the 'Supply Chain Finance' is a continuous fixed term that is limited to appearing in title, abstract, keyword and textual content. After searching, there was a total of 153 research articles written in English for reviewing in 'Scopus', 19 in 'WoS', and 440 in 'Google Scholar' between 2002 and 2022 (February). After deleting duplicate and invalid articles, 529 pieces in the three databases described above were preserved, involving an extensive range of information (e.g., electronic database, print source, and grey literature review) as Jesson et al. [32] suggested for documenting source types when conducting a systematic literature review. Figure 5 depicts the source types for these 529 articles. The majority (297 papers, 56.14%) are journal papers, followed by conference papers (57 papers, 10.78%), book sections (45 book sections, 8.51%), theses (31 pieces, 5.86%), books (29 books, 5.48%), reports (22 pieces, 4.16%), and the remaining parts of 7.94% are other documents (generic, 6.81%; working papers 2.27%).

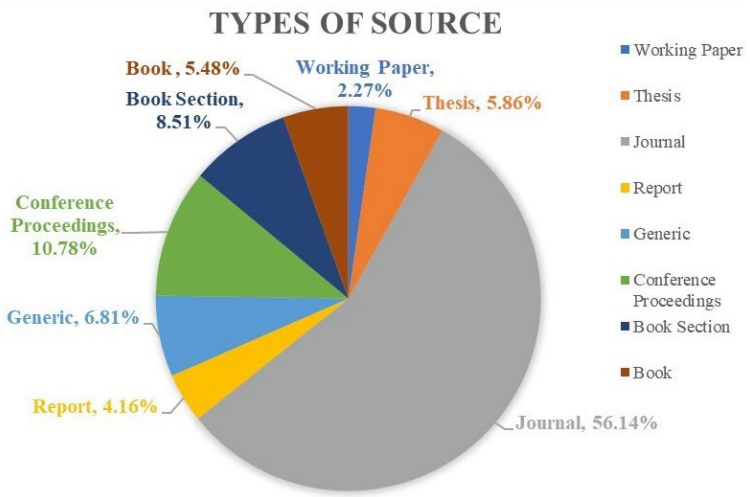

Figure 5. Article type involving both SCF and Financial ecology/ecosystem.

Simultaneously, to ensure the quality of the article selection, this paper according to the theory from Jesson et al. [32], limits the source type to electronic databases (e.g., journal papers) and refers to the AJG2018 ranking list of journals. AJG is the Academic Journal Quality Guide, published by the Association of Business Schools (ABS). Of the 297 selected journal papers, 132 were found to be published in 58 of the AJG2018 journal lists (4 articles in 2 journals marked with 4*; 12 articles in 4 journals marked with 4; 62 articles in 20 journals marked with 3; 32 articles in 17 journals marked with 2; 22 articles in 15 journals marked with 1), accounting for 44.44% of the papers in the selected journals (see Table 3).

Table 3. The number of journals and articles involving both the perspectives of SCF and financial ecology/ecosystem included in the AJG2018 published between 2002 and 2022 (February).

Source of Journal	AJG2018	Number of Articles
International Journal of Production Economics	3	10
International Journal of Production Research	3	8
IEEE Transactions on Engineering Management	3	7
Industrial Management & Data Systems	2	7
Annals of Operations Research	3	6
International Journal of Operations and Production Management	4	6
Journal of Purchasing and Supply Management	2	6
Technological Forecasting and Social Change	3	6
International Journal of Logistics Research and Applications	1	5
Production and Operations Management	4	4
Business Strategy and the Environment	3	3
Industrial Marketing Management	3	3
Journal of Business and Industrial Marketing	2	3
Supply Chain Management: An International Journal	3	3
Computers & Industrial Engineering	2	2
Enterprise Information Systems	2	2
Expert Systems with Application	3	2
International Journal of Management	3	2
Journal of Business Research	3	2
Journal of Entrepreneurship	1	2
Journal of Theoretical and Applied Electronic Commerce Research	1	2
Management Science	4*	2
Organization Science	4*	2
The TQM Journal	1	2
Transportation Research Part E: Logistics and Transportation Review	3	2
Asia Pacific Business Review	2	1
Computational Economics	1	1
Economic Systems	2	1
Information & Management	3	1
Information Processing and Management	2	1
Information Resources Management Journal	1	1
Information Systems Management	2	1
Intelligent Systems in Accounting, Finance and Management	1	1
International Journal of Business and Systems Research	1	1
International Journal of Contemporary Hospitality Management	3	1
International Journal of Finance and Economics	3	1
International Journal of Forecasting	3	1
International Journal of Industrial Engineering & Production Research	1	1
International Journal of Innovation, Creativity and Change	2	1
International Journal of Services and Operations Management	1	1
International Journal of Technology Intelligence and Planning	1	1
International Review of Financial Analysis	3	1
International Transactions in Operational Research	1	1
Journal of Business Logistics	2	1
Journal of Development Studies	3	1

Table 3. *Cont.*

Source of Journal	AJG2018	Number of Articles
Journal of Industrial and Business Economics	1	1
Journal of Knowledge Management	2	1
Journal of Macromarketing	2	1
Journal of Organizational and End User Computing	1	1
Journal of Product Innovation Management	4	1
Journal of Rural Studies	3	1
Journal of Sustainable Finance & Investment	1	1
Journal of the Association for Information Systems	2	1
Electronic Commerce Research and Applications	2	1
Management Decision	2	1
Production Planning and Control	3	1
Research in International Business and Finance	2	1
Review of Finance	4	1

Note: According to the rating definition of AJG 2018, 4* means journal of distinction in the field, 4 means top journals in the field, 3 means excellent journals in the field, 2 means acceptable standard journals in the field, and 1 means modest standard journals in the field.

Furthermore, after reviewing the abstracts and introductions of 132 articles collected by journals included in AJG2018, it discovers that in existing research papers, the methods of 'Model Simulation', 'Literature Review', 'Conceptual Framework', 'Case Study', 'Investigation Research', and 'Empirical Analysis' appear to be very popular. However, many articles also use a hybrid approach combining quantitative and qualitative methods, such as theory-oriented procedures with field investigation (see Table 4).

Table 4. Details of analyzed articles by methodology.

Methodology	Numbers	Percentage
Mixed	14	10.61%
Case Study	14	10.61%
Conceptual Framework	6	4.55%
Model Simulation	23	17.41%
Literature Review	35	26.52%
Investigation research	16	12.12%
Empirical Analysis	24	18.18%

4. Data Integration and Analysis

This section focuses on the information and data integration from the journal articles selected above to map, link, and find the corresponding answers by conceptual development description or content analysis based on two different research questions.

4.1. Conceptual Development Analysis

This part of the conceptual development analysis is centered on the first research question, "How many stages of SCF development have been experienced?". After reviewing the filtered literature mentioned above through reading the abstract, keywords, and introduction with the description analysis (mirrored into the process of the related literature collection in Section 3), the following is clear: SCF is a new financial concept with a growing development trend based on the theory of the SC for effective integration of SC and finance [1]. It has many new characteristics and goes beyond traditional SCM and financial supply chain management (FSCM).

At the traditional level, SCM aims to comprehensively manage all aspects of the entire SC (e.g., suppliers, manufacturers, and distributors) to meet the customers' needs. Moreover, it works through each link in the SC, including purchasing, material management, manufacturing, distribution, and marketing, to reduce costs and maximize profits for all supply members while improving cooperation among SC partners in terms of goods, infor-

mation, and capital flows [40–43]. Furthermore, R. W. Seifert and D. Seifert [44] considered traditional SCM as 'physical supply chain management', also known as PSCM.

To distinguish PSCM, the concept of FSCM emerges. The FSCM seems more specific than the PSCM for managing the capital/financial flow in the SC. Generally, FSCM occurs along with significant economic events and money-related activities when a company purchases products from another SC participant [45]. Through FSCM and financial optimization, the cash flow throughout the SC may become more visible, assisting organizations in reducing working capital, saving costs, increasing credits, and obtaining more investment opportunities. Upon reflection, the viewpoints of Popa [46], Wei [27], and Caniato et al. [47] were that FSCM aims to unify the finance, information, and material flows, balancing the financial allocation and eventually achieving the competitive advantage of the entire chain. In addition, Cronie and Sales [48] pointed out that a well-designed FSCM necessitates efficient internal processes and effective collaboration among SC partners. Furthermore, Kristofik et al. [49] also stated that FSCM considers optimizing an enterprise's working capital from both inside and outside. As a result, pursuing a better internal financial process and locating efficient external capital situations appear to be fatal drivers to stimulate SC financial optimization, further carrying out the specialized SCF concept.

One key feature of the SCF is that some financial institutions treat the Cos, the upstream and downstream partners in the SC, as a whole. The Cos rely on the real and effective industrial chain to create its 'guarantee' to help solve the financial difficulties and barriers of its upstream and downstream partners, especially for those small and medium-sized collaborators (SMEs). As a consequence, the overall SC's operational efficiency improves. The essence of SCF is to integrate the four flows of 'business/commodity', 'logistics', 'capital', and 'information' from the foundation of a CO, offering better financial support and service for the entire SC [1,50]. Despite the SCF's short history, most previous studies demonstrated that the SCF's development goes through three stages of SCF: 1.0, 2.0, and 3.0 (see Figure 6).

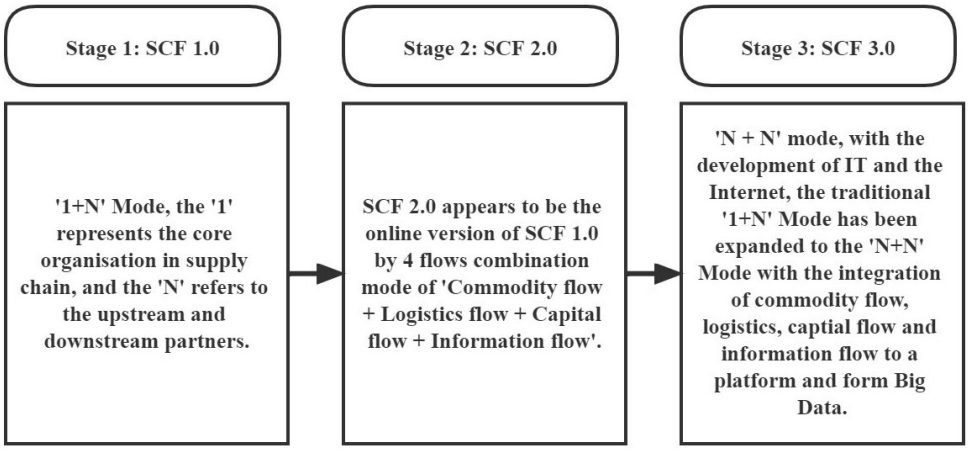

Figure 6. SCF Development Stages.

- SCF 1.0: Traditional '1 + N' Mode

The traditional '1 + N' mode seems to be the initial stage of the SCF; it is called SCF 1.0. Most scholars [1,50–53] believed that the CO plays a significant role in SC. Meanwhile, the upstream/downstream players, and financial institutions, are also important SC components. Banks and banking systems are primarily referred to as financial institutions in this phase [1,27,42,50]. According to the credit support from the CO of '1' in the SC and through the control of the four flows of 'business', 'logistics', 'capital', and 'information', the financing credit support for 'N' of the upstream and downstream partners (particularly for SMEs) is completed (see Figure 7).

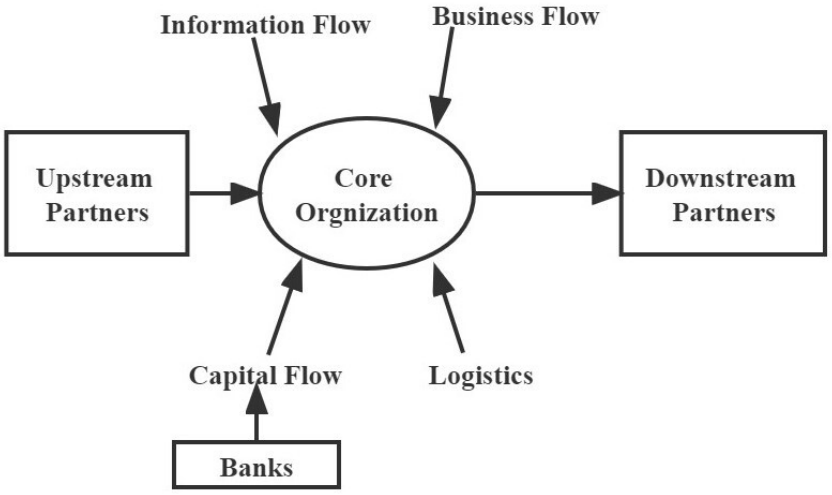

Figure 7. SCF 1.0: Traditional '1 + N' Mode.

- SCF 2.0: 4 Flows Combination Mode

In this stage, the Internet seems critical for promoting SCF development. Along with the widespread use of the Internet and intelligent devices, traditional offline SC businesses have started moving online. H. Chen [50] and Shen et al. [1] pointed out that the data of Cos should be connected online so that banks can obtain all kinds of factual trade information, which relates to warehousing, payment, and other accurate business of the upstream and downstream enterprises in the industry chain. The main features of this stage are that the four flows of 'business', 'capital', 'logistics', and 'information' begin to be combined, and the version of SCF 2.0 is formulated [1,50,53]. Furthermore, traditional commercial banks play an essential role in the financial market. Other organizations, such as financial leasing institutions, factoring companies, and securities firms, also proceed with providing capital services (Figure 8). Except for above, the COs, suppliers (upstream), distributors (downstream), logistics companies, and financial institutions are all linked by the Internet during the process of obtaining financial support and capital assistance in the SCF 2.0 stage [1]. SCF 2.0, compared to SCF 1.0, emphasizes the ability of digital technology and the Internet to eliminate information asymmetry [27].

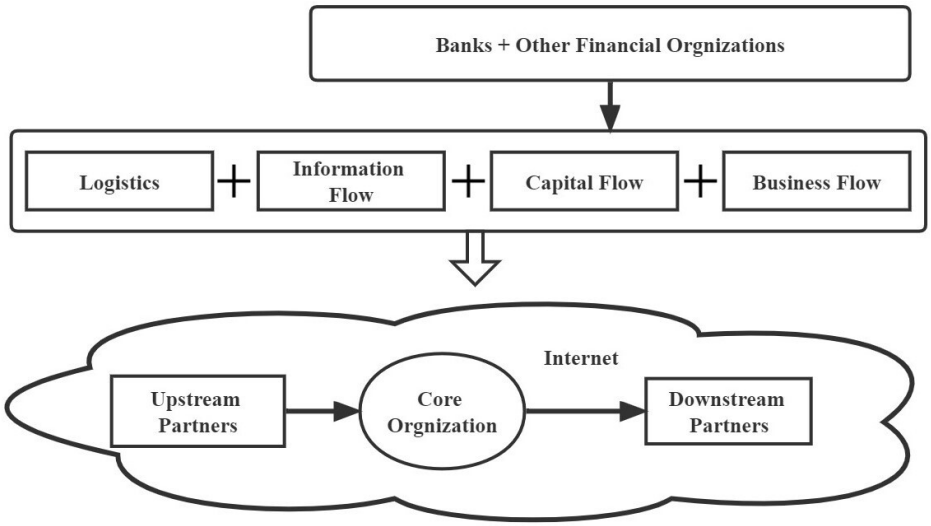

Figure 8. SCF 2.0: 4 Flows Combination Mode.

- SCF 3.0: Platform 'N + N' Mode

The 4th industrial revolution and the maturity of Information technology (IT) promote the further development of SCF 3.0. In particular, this stage indicates that financial market centralization is moving towards decentralization. With the popularity of smart terminals, traditional financial institutions such as banks have lost their central position, and SCF-related business have started to present on Internet platforms [1,50]. The network offers a third-party information service platform and introduces more capital providers [42,50]. Wei [27] and C. Y. Lin [43] pointed out that the financial organizations are not only limited to banks, but also extend to small loan companies and even individual investors (e.g., P2P). In other words, the financial market structure is decentralized, in line with the law of IT development itself. Meanwhile, the SMEs' orders, waybills, receipts, and financing are gathered on the platform. Furthermore, 'business, logistics, capital and information flows' are unified to form the Big Data [1,27,50]. As a result, the previous '1 + N' mode centered on the COs has been expanded into the 'N + N' mode, which focuses on SMEs' transactions and finally forms the SCF 3.0 of platform mode (see Figure 9).

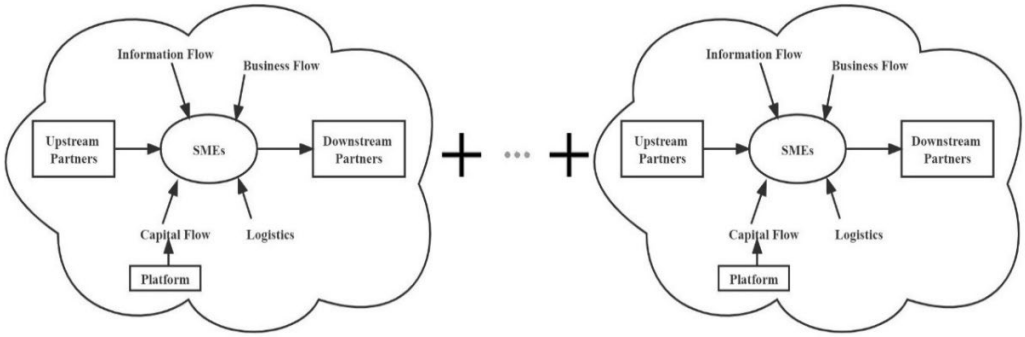

Figure 9. SCF 3.0: Platform 'N + N' Mode.

4.2. Content Analysis

This part focuses on finding the answer to the second research question, "How are the terms 'Supply Chain' and 'Finance' understood in the context of financial ecology?". Early scholars [18] generally divided SCF into two levels of 'Supply Chain-oriented' and 'Financial-oriented'. The 'Supply Chain-oriented' mainly means the financing objects or actors that arise around the main body of the SC [14,54]. The 'Finance-oriented' refers to the financial solutions, tools, technology (Fintech), activities, and relationship maintenance on the SC's 'platform' for financing [12,45]. When the terms 'Supply Chain' and 'Finance' are placed within financial ecology scenarios, the financial ecosystem model proposed by Wei [27] and Shen et al. [1] with the three plates of 'Financial ecological stakeholders', 'Financial ecological supply chain platform', and 'Financial eco-environment' is incorporated for better understanding. Here, the term 'Financial ecological stakeholders' is about the financial entities/actors, and the 'Financial ecological supply chain platform' involves the financial solutions, instruments, technology, and collaborative relationships provided by the platform based on the Internet, and the 'Financial eco-environment' relates to the macro political, economic, cultural, and industrial environment in which SCF is rooted. In addition, to explicitly answer this question, the content analysis is introduced based on a thorough review of 132 selected papers. Before beginning the content analysis, a coding system was established to record the paper's information such as the topic, authors, research directions, and definitions relating to SCF. Following an extensive reading, the understanding of 'Supply Chain' and 'Finance' is synthesized and reclassified into eight sub-SCF dimensions under three sub-areas of the financial ecosystem, with a summary of the corresponding article number counts and related proof quotes (see Table 5).

Table 5. An overview of the sub-SCF dimensions and key coding terms from the financial ecosystem perspective.

Sub-Areas of Financial Ecosystem	Key SCF Dimensions		Key Coding Terms	Article Counts	Selected Representative References	Proof Quotes (Exemplary)
Financial ecological stakeholders	Supply Chain-oriented:	(1) Financing Actor	Core Organizations (COs); Upstream; Downstream; Financial Institutions; Banking Sectors; Customers; Third-Party Logistics Providers (3PLs); Small and Medium Enterprises (SMEs); Suppliers; Manufacturers; Wholesalers/Distributors; Retailers; Customer	70	Randall and Farris [55]; Hong [56]; C. Huang et al. [57]; C. Bals [20]; S. Li and Chen [58]; X. Chen et al. [59]; C.-Y. Lin [43]; Jia et al. [39]	*"SCF actors include primary actors (buyers and suppliers) and supportive actors (banks, non-bank financial institutions, logistics service providers and platform providers"* [57].
Financial ecological supply chain platform	Finance-oriented:	(2) Financial Solution	Working Capital Optimization/Management; Financial Performance; Financial Product/Service/Solution; Financial Business Innovation	69	Hofmann [6]; Wuttke et al. [17,60]; Camerinelli [12]; Lamoureux and Evans [45]; Gelsomino et al. [18]; Caniato et al. [47]; S. Li and Chen [58]; L. Chen et al. [61]	*"SCF optimizes financial flows at an inter-organizational level through solutions implemented by financial institutions or third-party technology and service providers with the ultimate goal of aligning financial flows with product and information flows within the supply chain"* [58].
		(3) Financial Instruments	Trade Credit; Asset-based Financing; Pre-Shipment Financing; Purchasing Order Financing (Buyer-driven); in-Transit Financing; Inventory Pledge; Post-Shipment Financing; Reverse Factoring; Accounts Receivable; Accounts Payable; Dynamic Discounting	35	Palia and Sopranzetti [62]; Hofmann [6]; Berger and Udell [63]; Camerinelli [12]; Sugirin [64]; Gomm [54]; R. W. Seifert and D. Seifert [44]; Basu and Nair [65]; Popa [46]; More and Basu [66]; Wuttke, et al. [60]; Ji and Gunasekaran [67]; X. Xu et al. [19]; C. Bals [20]; Ali et al. [68]; L. Chen et al. [61]; X. Chen et al. [51]; C. Huang et al. [57]	*"SCF arrangements are not limited to accounts receivable or accounts payable financing solutions but also include other forms of network financing, including factoring and reverse factoring, inventory and warehouse financing, dynamic discounting, leasing and other instruments"* [69].
		(4) Technology	Digital Finance; Financial Technology (Fintech); Internet of Things (IoT); Blockchain; Big Data	61	Fellenz et al. [52]; Lamoureux and Evans [45]; Omran et al. [13]; Gomber et al. [70]; C. Bals [20]; Palmie et al. [71]; Z. Liu [72]; Cui [73]; Zhang-Zhang et al. [74]; Ning and Yuan [75]; L. Chen et al. [61]	*"The digital technology (e.g., Blockchain) promotes the development of supply chain finance from three aspects: the realization of information symmetry among participating parties, the realization of core enterprise credit transfer, the realization of supply chain financial process visibility, risk controllability, and full-service coverage"* [72].

Table 5. *Cont.*

Sub-Areas of Financial Ecosystem	Key SCF Dimensions		Key Coding Terms	Article Counts	Selected Representative References	Proof Quotes (Exemplary)
Financial ecological supply chain platform	Finance-oriented:	(5) Platform	Information Processing; Operational and Financial Decisions; Information Asymmetry; Credit Management; Risk management; Flows Integration	62	More and Basu [66]; Omran et al. [13]; Wei [27]; De Reuver et al. [76], Shen et al. [1]; Du et al. [77]; M. Li et al. [78]; Wan and Qie [79]; Jia et al. [39]; L. Chen et al. [61]; Ning and Yuan [75]; Q. Huang et al. [80];	*"An SCF platform has positive effects on optimizing the coordination of flows of funds, materials, and information and can promote all SCF actors' ability of resource acquisition, sharing, and integration"* [75].
		(6) Supply Chain Collaboration (SCC)	Dynamic Network; Collaborative Operation/Relationships	26	Camarinha-Matos and Afsarmanesh [81]; Graca and Camarinha-Matos [82]; X. Liu et al. [83]; C. Bals [20]; Shi and Mena [84]; H. Song et al. [85]; Olan et al. [86]	*"SCF has the main characteristic of incorporating financing activities into the context of supply chain management, which emphasizes the intersection of logistics, supply chain collaboration, and finance"* [85].
Financial eco-environment	(7) Regulations		Laws; Financial Regulations; Financial Stability; Policy; Economic Development; Industrial Culture	22	Acharya [87]; Milne [88]; Kupiec [89]; Abedifar et al. [90]; H. Zhang et al. [91]; G. Wang et al. [92]; X. Li and Zhou [93]; Chao et al. [69]	*"In financial regulation, by constructing financial networks, one can discover the structural nature of the network of financial institutions, impose balanced management, and intervene and block the network spread of risks"* [57].
	(8) Sustainable Supply Chain Finance (SSCF)		Life-Cycle; Value Innovation; Competitive Advantage; Social/Economic Aspects	21	Tseng et al. [94]; Tseng et al. [95]; C. Huang et al. [57]; Jia et al. [96]; X. Chen et al. [51]; Olan et al. [86]	*"Both economic and social aspects are the two most crucial aspects within sustainable supply chain finance"* [94].

- Financial ecological stakeholders (Supply Chain-oriented)

(1) Financing Actor

The financing actors are the most crucial component in 'Supply Chain-oriented' financing adoption, which reflect as 'Financial ecological stakeholders' in the financial ecology perspective. Randall and Farris [55], Hong [56], S. Li and Chen [58], C.-Y. Lin [43], and C. Huang et al. [57] believed that the actors for SCF adoption refer to both main actors (e.g., upstream suppliers, COs, and downstream buyers) and supportive actors (e.g., banks, financial institutions, logistics service providers and technology providers, and SMEs, etc.). Similarly, X. Chen et al. [59] and Jia et al. [39] began with the COs in SC and clarified the SCF participants before outlining the SCF business model. X. Chen et al. [59] pointed out that except for traditional financial institutions, the four types of COs that adopt SCF relate to: (1) Third Party Logistics (3PLs), (2) B2C/C2C and B2B E-commerce platforms, (3) manufacturers with strong bargaining power and favorable credit, and (4) professional software providers. Jia et al. [39], based on the dominant financing services and products' player, regarded SCF business actors and models as 'manufacturer-centered', 'bank-centered', '3PL-business' and 'supply-chain-players-centered'.

- Financial ecological supply chain platform (Finance-oriented)

(2) Financial Solution

Many early studies [17,18,60] viewed SCF as a set of solutions aiming at SC-wide working capital optimization, which enables the alignment of the financial flow with information and product flows along with the SC and benefits in cash flow management, performance improvement, and financing cost reduction for all parties involved. Furthermore, Hofmann [6], Camerinelli [12], Lamoureux and Evans [45], S. Li and Chen [58], and Shi and Mena [84] emphasized that SCF is a practical approach carried out by financial institutions or third-party technology and service providers for resolving financial crises at an inter-organizational level. Based on cooperation among SC participants, the SCF adoption may more easily form new loan opportunities for 'weak' actors in the SC with lower debt costs [18]. Furthermore, Randall and Farris [55] stated that the SCF solution could improve trust, commitment, and profitability throughout the SC. Except for the above, Olan et al. [86] proposed that the SCF might provide advantages in sharing working models in the SC through managing inter-organizational financial flows.

(3) Financial Instruments

Financial instruments are important means of putting the goals of financial solutions into action. Hofmann [6], Camerinelli [12], More and Basu [66], and Wuttke et al. [60] generally perceived that the SCF is made available through a variety of financial instruments with liquidity value modification to carry out the working capital optimal management. Depending on the stage in which the SC activity takes place, SCF financial instruments can be divided into three categories: pre-shipment financing (e.g., purchasing order financing) [12], in-transit financing (e.g., inventory and warehouse financing) [6,67], and post-shipment financing (e.g., factoring and reverse factoring) [6,44,46,60,66]. However, other scholars believed that the SCF implementation should not be limited to the aforementioned financial tools, but also should include items such as a letter of credit [12,64], accounts receivable [18,62], accounts payable [64], dynamic discounting [18,65], leasing [6,63], fixed assets financing [54,68], and network financing [51]. All the above execution tools optimize the working capital by increasing liquidity, resulting in win–win situations for buyers and suppliers [13,46].

(4) Technology

With the development of the Internet and digital technology, the incorporation of digitalization and financial services has cultivated a new term of financial technology (Fintech) in the 21st century. It has colloquially resulted in significant growth in new business models and creative changes in the finance sector. It has also been identified as

a critical driver of financial development, inclusion, social stability, and integrity [74]. In the current era, Fintech, referring to all types of technological innovations, has expanded to any sector related to finance [70,71]. Fellenz et al. [52] treated SCF as a model to integrate the physical and service aspects with distribution, information and capital flow, aligning them in the whole SC from the Fintech side. IoT, Big Data, and blockchain being applied to financial sectors are typical examples of Fintech. Taking blockchain as one of the most common ways in Fintech to solve the problems of information asymmetry and financing risks brought by complex relationships among SC actors when adopting SCF practice, Lamoureux and Evans [45] and Cui [73] believed that blockchain could increase the SCF funding efficiency with the risk mitigation and real-time visibility rising. Similarly, Omran et al. [13] and Z. Liu [72] realized that blockchain promotes SCF development in three ways: the realization of information symmetry among participating parties, the realization of core enterprise credit transfer, and the realization of the SCF-process visibility, risk controllability, and full service coverage.

(5) Platform

The platform-based sharing economy has emerged alongside the rise of digital technology. Meanwhile, the sharing economy has permeated financial services, and the SCF business model has evolved to a 'digital platform-based model' [77,78]. Similarly, after Shen et al. [1] and Wan and Qie [79] introduced the concept of 'platform' into SCF, using platforms could bring numerous benefits, including the enhancement of the ability to collect and combine data, information, finance, logistics, and business flows, resulting in precise capital assistance. De Reuver et al. [76], in particular, stated that adopting the SCF platform at the intra-organizational level may provide a more convenient approach to business processing and value delivery; while Ning and Yuan [75] pointed out that an SCF platform at the organizational level can promote the ability of all SCF actors to acquire, share, and integrate resources. Additionally, Wei [27] and Shen et al. [1] integrated the 'financial ecosystem' and further materialized the platform at the Internet-based operational level, perceiving it has a practical function in information processing, operation, service platform, and risk management. Furthermore, Q. Huang et al. [80] also emphasized that the information-processing mechanisms on the SCF platform might ultimately improve the SMEs' financial performance. However, with a more complex relationship and operational mechanism being implemented in the SC platform, SCF also has the disadvantage of various inefficiencies, such as information asymmetry and financing risks [13,66].

(6) Supply Chain Collaboration (SCC)

The dimensions of SCC have received much attention in the literature. C. Bals [20], based on Kraljic [97], further stated that the power of both the purchasing company and supply market should always be considered because collaboration works best in balanced relationships. Considering the SCF field, X. Liu et al. [83] regarded the SCF as a collaborative entity made up of three participants (debtors, banks, and loan service providers), and the successful implementation of the SCF was dependent on improved cooperation and collaboration in the same language among partners. Scholars [20,85] believed that the SCC and network represent the new integrative innovation in SCF processes for SC partnerships working towards improving and building a beneficial pool of products, and resources and services allocation. Besides, Olan et al. [86] recently emphasized that the SCC considers the relationships among SC partners in defining the overall structure for a sustainable supply network, stressing the significant integration of new structures with existing interconnections. In addition, Camarinha-Matos and Afsarmanesh [81] blended the financial ecosystem concept into understanding a collaborative network. Based on this viewpoint, Graca and Camarinha-Matos [82] further put forward the idea of a Collaborative Business Ecosystem (CBE) from the perspectives of sustainable development, actor collaboration, and performance improvement.

- Financial eco-environment

(7) Regulations

Financial regulation is the foundation of financial stability [69]. Acharya [87] and Milne [88] suggested that financial stability is a significant assurance for the national economy's healthy and orderly development and long-term social benefits, reflecting that financial operation provides continuous resource allocation optimization. Risk monitoring and regulation of financial services, financial institutions, capital flows, credit systems, and financial security are the main factors affecting financial stability [89,90]. In terms of the SCF supervision, H. Zhang et al. [91] summarized the credit risk of the 'point to line' form in the multiparty participating regulation and assumed that it should take somewhat of a three aspects control: contract evaluation, multi-side interconnection of warehouse supervision, and continuity delivery. G. Wang et al. [92] and Chao et al. [69] contended that building financial networks is advantageous for achieving network structuredness of financial institutions, implementing balanced management, and intervening and interrupting the risks spread of networks in financial regulation. However, with the SCF's continuous innovation, there are still many problems and challenges in technology, law, and financial systems, such as increasing network security risks, a lack of supporting legal policies, and the impact on the current financial system for financial regulation [93].

(8) Sustainable Supply Chain Finance (SSCF)

SSCF, as a newly derived definition based on the original SCF, addresses the challenges posed by the 2008 economic downturn and the post-COVID-19 pandemic by holistically linking financial institutions and traders with SC players [86]. Previous studies advocated that SSCF can provide financial benefits and environmental and social value contributions [96]. In particular, it helps the sharing of collaborative resources, the forming of financing models, and the establishment of government grants and the achievement of sustainable development for each SC sector, thereby improving whole-SC sustainability [51,57,94]. As a suggestion for effectively promoting SSCF, Tseng et al. [94] emphasized that the financial and social aspects are the two most important aspects of carrying out SSCF. However, Tseng et al. [95] changed perspective in their later study and mentioned that SC players who desire to implement SSCF should pay more attention to collaboration on value innovations, strategic competitive advantages, and financial aspects while not disregarding the other attributes to improve performance.

5. Discussion

5.1. Answering the Research Questions

To answer research question 1, "How many stages of SCF development have been experienced?", a related conceptual development review is conducted based on selected resources. SCF evolved by successfully integrating finance into SC [1]. It has a variety of novel traits and transcends conventional PSCM and FSCM. To enhance an organization's working capital, SCF is carried out based on the definition of FSCM, which focuses on the combination of the four flows of business/commodity, logistics, capital, and information. Even in its short history, SCF has gone through three stages: SCF 1.0, 2.0, and 3.0. Considering research question 2, "How are the terms 'Supply Chain' and 'Finance' understood in the context of financial ecology?", the understanding of 'Supply Chain' and 'Finance' would be reclassified into eight subdimensions (Financing Actor, Financial Solution, Financial Instruments, Technology, Platform, SCC, Regulations, and SSCF) under three financial ecology perspectives of the financial ecosystem model [1,27]. 'Supply Chain-oriented' links to 'Financial ecological stakeholders' and is mainly demonstrated by the fact that SCF players are financial entities or actors all based around the SC. 'Financial-oriented' relates to detailed financial solutions, instruments, platforms, and SCC, primarily gathering at the 'Financial ecological supply chain platform'. In addition, the 'Financial eco-environment' means the reasonable regulations and sustainable political, economic, cultural, and industrial context needed to underpin the healthy operation of the whole SC ecosystem.

Based on content analysis for the above eight redefined subdimensions, it is clear that the SCF and financial ecology concepts should not be separated, and SCF cannot operate in isolation. The industry's whole SC could be treated as a certain ecosystem to some extent, and the understanding of 'Supply Chain' and 'Finance' should involve a holistic view of the SC ecosystem.

5.2. Comparison with the Previous Literature

Considering the combination of the financial ecology/ecosystem and the SCF, C. Bals' [20] research can be seen as a benchmark in the field. C. Bals [20] first conducted systematic SCF ecosystem research in the eight areas: SCC, organization, financial, technology, market and regulation, product, stakeholder perspective, and life cycle. However, when compared to the current SCF research, as revealed by the six representative studies in Section 1, some discrepancies regarding the study of SCF were detected.

Camerinelli [12] researched SCF via a literature review and likened it to a 'glue' used to improve liquidity values, with working capital optimization through 'end-to-end' operational, financial flow alignment. SCC, organization, finances, product, and stakeholder perspectives [20] are considered in this study, but three other dimensions, technology, market and regulation, and life cycle, are not included.

Moreover, Pfohl and Gomm [14] examined the financial role in SCF and first proposed a mathematical model of SCF. According to their model, SCF has been proven to optimize cash flows while lowering costs. Perspectives on the SCC, organization, finances, and products have been clearly stated, while four other topics (technology, market and regulation, stakeholder, and life cycle) that C. Bals has summarized do not involve to [20].

D. Seifert et al. [98] began with six primary supply-side motives and three major demand-side motives to identify the importance of trade credit among action factors of order quantity, credit term, and settlement period decisions. Although this study is related to the financial, SCC, and stakeholder dimensions that C. Bals [20] proposed, with an emphasis on an organization's internal and external operation management, it does not precisely define the enterprise types (e.g., COs/SMEs) and the specific role an enterprise plays in the SCF.

Subsequently, Gelsomino et al. [18] systematic research redefined SCF from the 'Supply Chain-oriented' and 'Finance-oriented' perspectives. It touched on the six factors of products, stakeholders, SCC, organization, finances, and technology mentioned by C. Bals [20]. Gelsomino et al. [18] study could be regarded as a systematic reference model in the SCF research field. However, probably due to the lack of a life-cycle perspective and a detailed strategy for carrying out SCF performance measuring, there is still room to expand SCF research from a market and regulation perspective in the future.

X. Xu et al. [19] study classified SCF into four research clusters: the deteriorating inventory model under credit policy, the inventory decisions made with trade credit policy, the interaction between replenishment decisions and delay payment strategies, and the roles of financing service in the supply chain. These are reflected in the three SCF dimensions mentioned by C. Bals [20]: finances, organization, and SCC. Even though X. Xu et al. [19] raised awareness of value creation for the entire SC by improving financial services, theirs still does not form a comprehensive financial systematic view.

Jia et al. [39] conducted a literature review to delve deeper into four SCF business models: a manufacturer-centered model, a bank-centered model, a 3PL-centered model, and an SC coordinator-oriented model. Jia et al. [39] identified business modes varying by enterprise type in the SC and emphasized the uncertainty in the dynamic environment that SCF faced. Building on the SCF-related research work of C. Bals [20], their work addressed five dimensions: financial, technological, organizational, stakeholder, and SCC. Jia et al. [39] contended that information processing in SCF might assist with minimizing the unpredictability caused by a dynamic environment. However, the processing is not informative enough to offer a specific SCF pattern, particularly from the perspective of the entire financial SC system.

The SCF with eight subdimensions and four stages [22] of financial ecological development was explored in C. Bals' [20] article. This research served as a forerunner for the development of an SCF ecosystem and contributed to the managerial implications of the presented framework from the viewpoint of various stakeholders.

5.3. Differences Identified in the Research

However, C. Bals [20] does not define the stages of SCF development, nor does it explain the understanding of 'Supply Chain' and 'Finance' from a financial ecology perspective. Therefore, in our paper, we reinforce these two features, while also complementing the SCF-related study. We treat the whole SC itself as the ecosystem, and believe the SCF exists across the entire SC. Meanwhile, we also agree that multiple stakeholders (supplier, buyer, government, financial institutions, and other solution providers) can be integrated into the SC ecosystem [61], forming a compendium of SC elements and entities that influence products, information, and capital flows via regulations, technology, monitoring, etc. [99]. Furthermore, we find that, although the previous literature has established the fundamental logic of SCF, there are still many externally unpredictable factors (e.g., technological developments, changes in the international economic situation or the business growth cycle), and new elements and actors are constantly emerging. This emphasizes the need to study SCF from the viewpoint of financial ecology, as concluded in the above systematic literature analysis. Following this, three factors that are necessities for the study of SCF from a financial ecological perspective are reiterated based on the above SCF conceptual development and content analysis, which includes:

(1) The Physical Similarity of the Natural Ecosystem

At the start of this paper, we mention that financial ecology is borrowed from the theory of natural ecology. The ecosystem is a biological concept that refers to a unified whole in a specific natural space. In these conditions, organisms and the environment interact with and constrain each other in a relatively stable dynamic equilibrium. The ecosystem's scope can be large or small [21]. Wei [27], C. S. Lin and Lin [42], and Shen et al. [1] also noted that the natural ecosystem is a part of bionics. Organisms and the environment are closely related to particular development laws. The same applies to financial ecology to some extent. More explicitly, financial institutions and actors are indispensable elements that interact in the financial ecosystem [27,100]. Thus, no matter the natural or financial ecosystem, each element helps and competes with each other. As a result, to better promote balance and cooperation, it is crucial to study SCF at the financial ecosystem level based on the similarity in terms of the physical principles of a natural ecosystem.

(2) SCF Environment Dynamicity

When considering 'Supply Chain' and 'Finance' under the financial ecosystem model [1,27] with the three aspects of 'Financial ecological stakeholders', 'Financial ecological supply chain platform', and 'Financial eco-environment', the dynamic environment SCF is rooted in is constantly changing. To some extent, the dynamic environment can be seen as a driver promoting SCF development because it forces the SCF practitioner to change, upgrade, and adapt to the environment. Wei [27], C. S. Lin and Lin [42], and C. -Y. Lin [43] realized that ever-changing internal and external surroundings might impact many COs in the industry chain. With significant IT development and rapid change in the digital environment, globalization and competition have become two features of the modern economy [42]. Implementing SCM, FSCM, and SCF (1.0, 2.0, 3.0) enables the four streams of business, information, logistics, and capital to be united to varying degrees to improve international competitiveness. As a result, capital is optimized, competitiveness is increased, and costs are reduced. Furthermore, F. Chen et al. [101], Guillen et al. [41], and C. S. Lin and Lin [42] discovered that treating the entire business chain as an ecosystem by implementing SCM, FSCM, or SCF may result in fewer uncertainties from both inside and outside its industry chain. In addition, it also has a positive effect, assisting all the SC members to cooperate with all the flows of materials/commodities, information, and finances, and bringing about

SC performance enhancement [1,102]. SCF research should thus consider the dynamic circumstances of industry/business and view the entire chain as an indivisible ecosystem.

(3) Supply Network Complexity

SCF goes through three stages: 1.0, 2.0, and 3.0. Although the primary function of SCF is to achieve competitiveness by combining four flows (business, information, logistics, and capital), the definition and dimension of an SC network vary across SCF development stages, limiting the SCF function and the four flow-integration degrees to some extent. Initially, SCF 1.0, the supply network is identified by the COs' position with regard to its upstream and downstream partners. In SCF 2.0, the SC network is not restricted to the traditional offline model; its network expands to an online mechanism. Subsequently, in SCF 3.0, based on the self-contained features of decentralization and disintermediation, the SC network starts to emerge in online platform formats, and the occurrence of '*N*' sub-supply chains adds significantly to a supply network's complexity [1,27,50]. At this SCF platform stage, Shen et al. [1], Bals et al. [103], and C. Bals [20] agreed with the financial ecology theory proposed by Mizgier [26] and suggested that "supply chain financial ecology should [be a] cross-industry, cross-region, cross-platform ecosphere [1]." In addition, Bascompte et al. [104] noted that platform-centric SC networks contain many disparate nodes and links that should not be allowed to exist in isolation while forming the modularity of the overall network, but rather should strengthen the correlation between the elements. Therefore, considering these dispersed and complex nodes and links in SC networks, sometimes referred to as ecosystem elements, conducting SCF research from the standpoint of the SC ecological network complexity may provide valuable insights for financial sector study [105].

5.4. Research Contribution: Towards a Framework of Further SCF Ecosystem Understanding

The first difference in our research is that it expands on the SCF ecosystem introduced by C. Bals' [20] initial systematic review by exploring SCF development stages and incorporating the understanding of two dimensions of 'Supply Chain' and 'Finance' into a financial ecosystem model [1,27] with three aspects. A second difference in our research is the reaffirmation of the necessity of an ecosystem based on the above analysis process, which summarizes three factors for an SCF study to consider: the physical similarity of the natural ecosystem, SCF environment dynamicity, and supply network complexity. Based on the research gaps identified, a framework for further understanding the SCF ecosystem is developed in this paper (Figure 10).

Given the similarity of the physical characteristics of natural ecosystems, a logical framework for understanding SCF based on financial ecosystems is extended. Two perspectives, 'Financial ecological stakeholders', including 'Financial Actors', and a 'Financial ecological supply chain platform' with five subdimensions (Financial Solutions, Instruments, Technology, Platform, and SCC), mirror the core understanding of 'Supply Chain' and 'Finance' in a financial ecology context. The remaining perspective, 'Financial eco-environment' [1,27], has two sub-aspects (Regulations and SSCF), which reflect the fact that a successful financial eco-environment can underpin the smooth operation of SCF. However, the surroundings that the SCF is rooted in are changeable, so it cannot be guaranteed that SCF will operate in a favorable financial environment. Therefore, it is important to take environmental dynamicity into account through regulations and SSCF to reach sustainable financial development and further facilitate SCF evolution. In addition, we cannot ignore the increasing complexity of supply networks, along with the upgrading of the SCF development stages, which in turn affect the construction of a sustainable SCF development environment. We propose that the industry's whole SC itself could be treated as an ecosystem, and the comprehension of SCF and financial ecology should not be separated. SCF cannot operate in isolation; it should constantly be modified to account for the changing environments and complex supply networks brought about by the different development stages.

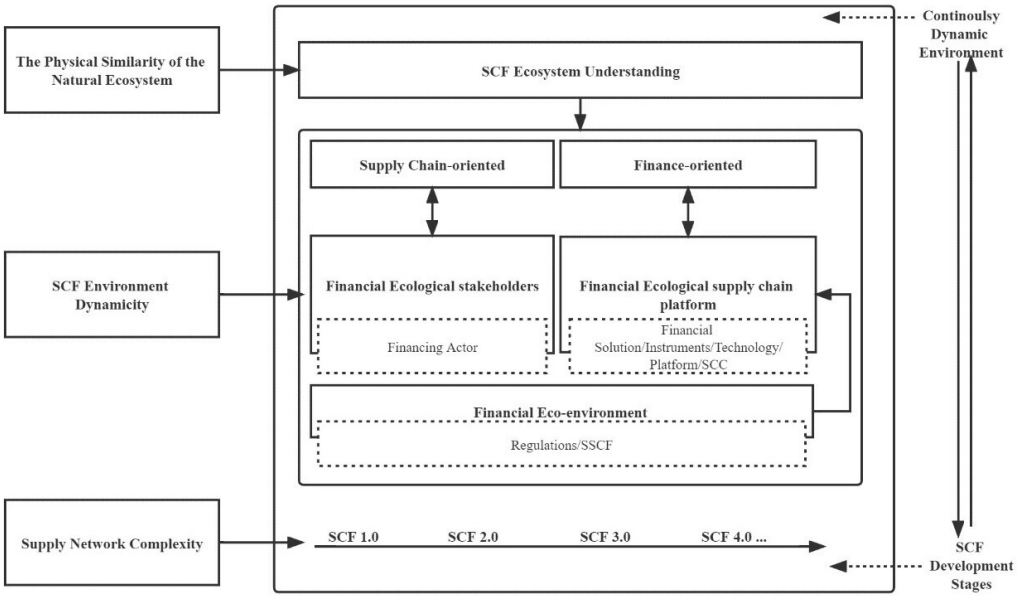

Figure 10. SCF Ecosystem Understanding Framework.

6. Future Research

After a comprehensive review of previous SCF-related literature, research gaps are identified in Section 5. Based on the above study, we make five research suggestions for the future.

Our first research suggestion is based on SCF 4.0, namely, focusing on the predictability of the SCF development stage. In the future, there will undoubtedly be an SCF 4.0 stage, and this will most likely dominate the future research agenda. Following H. Chen's [50] forecast, SCF 4.0 lies in improving business integration and the combination of the four online flows of logistics, information, business, and capital. More specifically, enhancing the ability of business combinations requires COs in SC to gather adequate information of customers and carry out real-time online integration. This process is based on financial technology/Fintech (e.g., Big Data and blockchain) to generate dynamic operation information, enabling active real-time management of loan enterprises with financial risk reduction in the SC [1,47]. Moreover, organizations would operate SCF to optimize enterprise resource allocation, reduce operating costs, and lower financial risk by merging the four online flows of logistics, information, business, and capital in SCF 4.0. Here, 'four flows in one' is the premise. Moreover, for achieving an enterprise's long-term development strategies, introducing the Internet and mobile technology to integrate the four flows is inevitable [1,13,50,53,56]. As a result, in addition to strengthening existing investments, SCF as one of the enterprise development tools, with the introduction of advanced financial-related IT and cloud computing, is required [13,50]. In the future, emphasis should be placed on creating a big platform for the SC and financial ecosystem, combining industry and finance by increasing technological investment and management. The new direction concentrates on accurately integrating the offline data of the four flows with online, performing cloud processing, taking advantage of burgeoning scientific technologies (e.g., mobile Internet, IoT and Big Data), and exerting digitalization and automation [103] influences on the SCF platform. The SC will no longer be a one-way flow; instead, it will stress multiparty cooperation within the entire financial ecosystem.

The second research suggestion relates to SCF standardization establishment. The early part of this paper explores SCF development stages 1.0, 2.0, and 3.0, based on previous research. Many scholars [18–20,39,103] have noted that the relationship between SCF theories and practice appears to be unbalanced. There seem to be no standards to distinguish SCF development levels from performance. When considering the context of the financial ecosystem, C. Bals [20] discovered that the SCF development stages are currently

between 'expansion' and 'leadership'. However, SCF adoption and further development on a global level will be difficult due to a lack of criteria and standardization to regulate the relationship between enterprises and partners. Thus, future research on SCF should focus more on standardization building to change this situation.

Our third research suggestion for SCF in the future relates to regional balance. The research in this paper is not limited to a specific region or country. It is not hard to see that the reference articles and data collected in the methodology section were mainly from countries with a high level of SCF research maturity, such as the United Kingdom, Germany, Italy, and China. However, this paper treats the whole industry in which an organization is rooted as an ecosystem; it should extend beyond geographical boundaries. As C. Bals [20] stated, taking time and geographical region into account may help us understand SCF success elements better and serve as a stepping stone to developing a standard SCF definition.

Our fourth suggestion for future SCF research is to take the dynamic environment and the effects of COVID-19 into account. SCF environmental dynamicity is one important consideration. The study of SCF always needs to adapt to the changing environment. At the beginning of 2020, COVID-19 spread around the world. D. Zhang et al. [106] pointed out that the global epidemic has created an unprecedented level of risk, resulting in significant global economic losses within a short period. Susan et al. [107] also recognized the need for a new business model, primarily focused on long-term crisis management mechanisms, which may protect the SC from economic crises. Namely, how SC leaders plan for sustainable medium- to long-term SC strategies in a continuously changing environment and promote SCF ecosystem innovation during and after an epidemic is another future research direction.

Our fifth suggestion for SCF research in the future is regarding the research methodology. Table 4 shows that most existing research methods for SCF study are based on qualitative, theoretical discussion, not adequately involving quantitative scientific data analysis. This phenomenon was also highlighted by Gelsomino et al. [18]: although empirical data-based assessments of individual SCF solutions (e.g., factoring and trade credit) have been discovered in the literature, there is still a paucity of scientific examinations addressing SCF from a more holistic perspective (e.g., state of the art/adoption level of the various SCF solutions). Even though some empirical studies are valuable for validating current models and assumptions [14], the data for assessing the diffusion of the SCF technique and applications remain ambiguous and do not entirely meet the research need. Thus, adopting more comprehensive quantitative empirical methodologies would be a suggestion for future SCF research.

7. Conclusions

To sum up, SCF is a new financial concept for offering an optimized financial product and service in the SC ecosystem, along with the development of IT. Although the history of SCF is not long, a significant number of previous studies have been conducted from various perspectives. However, as proposed by Gelsomino et al. [18], X. Xu et al. [19], C. Bals [20], and Bals et al. [103], the theory behind SCF is limited, resulting in an imbalance between the SCF hypotheses and their practice. Moreover, there seems to be little previous study involving financial ecology; even though it was mentioned, it was at a rather one-sided, descriptive level, with fragmented research dimensions, restricting the deeper understanding of SCF.

Therefore, to address this gap, this study, based on 132 selected journal articles, conducts a systematic literature review from the perspective of financial ecology driven by two research questions of (1) "how many stages of SCF development have been experienced?" and (2) "how are the terms 'Supply Chain' and 'Finance' understood in the context of financial ecology?". After surveying the SCF conceptual development and content analysis, we find that SCF development has gone through three stages: SCF 1.0, 2.0, and 3.0. Meanwhile, in the context of financial ecology, we understand 'Supply Chain' and 'Finance' through

eight SCF subdimensions within three financial ecology perspectives based on the financial ecosystem model [1,27] and view the entire SC as an ecosystem.

We compare with previous SCF research, but given the inadequate knowledge of ecosystem-based SCF study initially proposed by C. Bals [20], we reiterate the necessity of studying it from a financial ecological perspective with three factors of the physical similarity of the natural ecosystem, SCF environmental dynamicity, and supply network complexity. Based on the research differences identified, a framework for the further understanding of SCF ecosystems is also contributed by this paper, with suggestions for five future research directions: (1) SCF 4.0 predictability; (2) SCF standardization; (3) regional balance; (4) dynamic environmental and COVID-19 impacts; and (5) empirical research methodology. The authors feel this SCF review provides theoretical contributions to the field.

However, there are also two shortcomings in this paper. Because SCF is a new research field, there appears to be no authoritative definition. According to Gelsomino et al. [18], SCF may be studied from both 'Supply Chain-oriented' and 'Finance-oriented' angles, which leads to numerous literal variants, such as 'Supply Chain Financ*', 'Financ* Supply Chain', and 'Capital Supply Chain'. However, in this paper, we mainly focus on the keyword SCF as a fixed term meaning, 'Supply Chain Finance'. Similarly, another study dimension, 'Financial Ecology', relates to 'Financ* Ecology/Ecosystem', 'Economic Ecology/Ecosystem', and 'Business Ecology/Ecosystem', etc. Although this paper attempts to select all journal sources that considered 'Supply Chain Finance' from a financial ecology perspective, we cannot guarantee that there were no omissions or deviations in the literature resources consulted due to the various keywords possible. Furthermore, even though we searched three relatively comprehensive databases ('Wos', 'Scopus', and 'Google Scholar'), we cannot guarantee that we have considered all articles related to SCF and financial ecology/ecosystem. As a result, the retrieved literature may impact the quality and scope of this study.

Author Contributions: Conceptualization, L.Z. and H.L.; methodology, L.Z.; software, L.Z.; validation, L.Z., M.C. and H.L.; formal analysis, L.Z. and M.C.; investigation, L.Z.; resources, L.Z.; data curation, L.Z. and H.L.; writing—original draft preparation, L.Z.; writing—review and editing, L.Z. and M.C.; visualization, L.Z.; supervision, H.L.; project administration, M.C. and H.L. All authors have read and agreed to the published version of the manuscript.

Funding: This work was supported by Incheon National University Research Grant in 2021.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Publicly available datasets were analysed in this study. This data can be found here: https://www.scopus.com/, https://access.clarivate.com/ and https://scholar.google.com/, all accessed on 13 February 2022.

Conflicts of Interest: The authors declared no potential conflict of interest concerning this article's research, authorship, or publication.

References

1. Shen, Y.; Chen, C.; Gu, J. Research on the Design of Supply Chain Financial Ecology Model and Risk Management. *Ecology* **2019**, *28*, 3653–3660.
2. Budin, M.; Eapen, A.T. Cash generation in business operations: Some simulation models. *J. Financ.* **1970**, *25*, 1091–1107. [CrossRef]
3. Haley, C.W.; Higgins, R.C. Inventory Policy and Trade Credit Financing. *Manag. Sci.* **1973**, *20*, 464–471. [CrossRef]
4. Wood, J.H. Financial intermediaries and monetary control: An example. *J. Monet. Econ.* **1981**, *8*, 145–163. [CrossRef]
5. Stemmler, L. The Role of Finance in Supply Chain Management. In *Cost Management in Supply Chains*; Springer: Berlin/Heidelberg, Germany, 2002; pp. 165–176.
6. Hofmann, E. Supply chain finance: Some conceptual insights. In *Beiträge Zu Beschaffung Und Logistik*; Supply Chain Management (SCM); Springer: Berlin/Heidelberg, Germany, 2005; Volume 16, pp. 203–214.
7. Sadlovska, V. *The 2008 State of the Market in Supply Chain Finance*; Aberdeen Group: Boston, MA, USA, 2008.

8. Gong, Y.; Xie, S.; Arunachalam, D.; Duan, J.; Luo, J. Blockchain-based recycling and its impact on recycling performance: A network theory perspective. *Bus. Strategy Environ.* **2022**. [CrossRef]
9. Lahkani, M.J.; Wang, S.; Urbański, M.; Egorova, M. Sustainable B2B E-commerce and blockchain-based supply chain finance. *Sustainability* **2020**, *12*, 3968. [CrossRef]
10. Liang, X.; Zhao, X.; Wang, M.; Li, Z. Small and medium-sized enterprises sustainable supply chain financing decision based on triple bottom line theory. *Sustainability* **2018**, *10*, 4242. [CrossRef]
11. Scfcommunity. Bridging Physical and Financial Chains. Available online: http://www.scfcommunity.org/ (accessed on 21 January 2022).
12. Camerinelli, E. Supply chain finance. *J. Paym. Strategy Syst.* **2009**, *3*, 114–128.
13. Omran, Y.; Henke, M.; Heines, R.; Hofmann, E. Blockchain-driven supply chain finance: Towards a conceptual framework from a buyer perspective. In Proceedings of the IPSERA 2017: 26th Annual Conference of the International Purchasing and Supply Education and Research Association, Budapest, Hungary, 9–12 April 2017; pp. 1–15.
14. Pfohl, H.C.; Gomm, M. Supply chain finance: Optimizing financial flows in supply chains. *Logist. Res.* **2009**, *1*, 149–161. [CrossRef]
15. Petr, P.; Sirpal, R.; Hamdan, M. Post-crisis emerging role of the treasurer. *Eur. J. Sci. Res.* **2012**, *86*, 319–339.
16. Walters, D. Effectiveness and efficiency: The role of demand chain management. *Int. J. Logist. Manag.* **2006**, *17*, 75–94. [CrossRef]
17. Wuttke, D.A.; Blome, C.; Foerstl, K.; Henke, M. Managing the Innovation Adoption of Supply Chain Finance—Empirical Evidence From Six European Case Studies. *J. Bus. Logist.* **2013**, *34*, 148–166. [CrossRef]
18. Gelsomino, L.M.; Mangiaracina, R.; Perego, A.; Tumino, A. Supply chain finance: A literature review. *Int. J. Phys. Distrib. Logist. Manag.* **2016**, *46*, 348–366. [CrossRef]
19. Xu, X.; Chen, X.; Jia, F.; Brown, S.; Gong, Y.; Xu, Y. Supply chain finance: A systematic literature review and bibliometric analysis. *Int. J. Prod. Econ.* **2018**, *204*, 160–173. [CrossRef]
20. Bals, C. Toward a supply chain finance (SCF) ecosystem—Proposing a framework and agenda for future research. *J. Purch. Supply Manag.* **2019**, *25*, 105–117. [CrossRef]
21. Tansley, A.G. The Use and Abuse of Vegetational Concepts and Terms. *Ecology* **1935**, *16*, 284–307. [CrossRef]
22. Moore, J.F. Predators and prey: A new ecology of competition. *Harv. Bus. Rev.* **1993**, *71*, 75–86.
23. Wang, W.; Yang, Y. The Latest Literature Review of Financial Ecology at Home and Abroad. *Acad. Res.* **2006**, *11*, 69–74.
24. Zhou, X. Further improve the financial ecological environment. *Financ. Res.* **2005**, *2*, 121–122.
25. Xu, N. On the financial ecological environment in China. *Financ. Res.* **2005**, *11*, 31–37.
26. Mizgier, K.J. Global sensitivity analysis and aggregation of risk in multi-product supply chain networks. *Int. J. Prod. Res.* **2017**, *55*, 130–144. [CrossRef]
27. Wei, X. Construction of the Ecological Model for Supply Chain Finance Based on Ecosystem Theory. In Proceedings of the 2018 4th International Conference on Economics, Social Science, Arts, Education and Management Engineering (ESSAEME 2018), Huhhot, China, 28–29 July 2018; pp. 561–564.
28. Pellegrino, R.; Costantino, N.; Tauro, D. Supply Chain Finance: A supply chain-oriented perspective to mitigate commodity risk and pricing volatility. *J. Purch. Supply Manag.* **2019**, *25*, 118–133. [CrossRef]
29. Scholtens, B. Why Finance Should Care about Ecology. *Trends Ecol. Evol.* **2017**, *32*, 500–505. [CrossRef]
30. Ahmad, S.; Omar, R. Basic corporate governance models: A systematic review. *Int. J. Law Manag.* **2016**, *58*, 73–107. [CrossRef]
31. Petticrew, M. Systematic reviews from astronomy to zoology: Myths and misconceptions. *BMJ* **2001**, *322*, 98. [CrossRef]
32. Jesson, J.; Matheson, L.; Lacey, F.M. *Doing Your Literature Review: Traditional and Systematic Techniques*; Sage Publications: Thousand Oaks, CA, USA, 2011.
33. Fink, A. *Conducting Research Literature Reviews: From the Internet to Paper*; Sage Publications: Thousand Oaks, CA, USA, 2019.
34. Kitchenham, B. *Procedures for Performing Systematic Reviews*; 0400011T.1; Keele University: Keele, UK, 2004; pp. 1–27.
35. Denyer, D.; Tranfield, D. Producing a systematic review. In *The Sage Handbook of Organizational Research Methods*; Buchanan, D.A., Bryman, A., Eds.; Sage Publications Ltd.: New York, NY, USA, 2009.
36. Finfgeld-Connett, D. Use of content analysis to conduct knowledge-building and theory-generating qualitative systematic reviews. *Qual. Res.* **2013**, *14*, 341–352. [CrossRef]
37. Nandy, B.R.; Sarvela, P. Content analysis reexamined: A relevant research method for health education. *Am. J. Health Behav.* **1997**, *21*, 222–234.
38. Cavanagh, S. Content analysis: Concepts, methods and applications. *Nurse Res.* **1997**, *4*, 5–16. [CrossRef]
39. Jia, F.; Blome, C.; Sun, H.; Yang, Y.; Zhi, B. Towards an integrated conceptual framework of supply chain finance: An information processing perspective. *Int. J. Prod. Econ.* **2020**, *219*, 18–30. [CrossRef]
40. Donald, B.J.; David, C.J.; Bixby, C.M.; John, B.C. *Supply Chain Logistics Management*; International Edition; McGraw-Hill: New York, NY, USA, 2013.
41. Guillén, G.; Badell, M.; Puigjaner, L. A holistic framework for short-term supply chain management integrating production and corporate financial planning. *Int. J. Prod. Econ.* **2007**, *106*, 288–306. [CrossRef]
42. Lin, C.S.; Lin, C.Y. Constructing a network evaluation framework for improving the financial ecosystem in small-medium size firms. *Technol. Econ. Dev. Econ.* **2018**, *24*, 893–913. [CrossRef]
43. Lin, C.Y. Optimal Core Operation in Supply Chain Finance Ecosystem by Integrating the Fuzzy Algorithm and Hierarchical Framework. *Int. J. Comput. Intell. Syst.* **2020**, *13*, 259–274. [CrossRef]

44. Seifert, R.W.; Seifert, D. Financing the Chain. *Int. Commer. Rev.* **2011**, *10*, 32–44. [CrossRef]
45. Lamoureux, J.F.; Evans, T.A. Supply Chain Finance: A New Means to Support the Competitiveness and Resilience of Global Value Chains. 2011. Available online: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2179944 (accessed on 21 January 2022).
46. Popa, V. The financial supply chain management: A new solution for supply chain resilience. *Amfiteatru Econ. J.* **2013**, *15*, 140–153.
47. Caniato, F.; Henke, M.; Zsidisin, G.A. Supply chain finance: Historical foundations, current research, future developments. *J. Purch. Supply Manag.* **2019**, *25*, 99–104. [CrossRef]
48. Cronie, G.; Sales, H. *ING Guide to Financial Supply Chain Optimisation*; ING Wholesale Banking: Hong Kong, China, 2008; pp. 1–5.
49. Kristofik, P.; Kok, J.; de Vries, S.; Hoff, J.V.S.-V.T. Financial supply chain management-challenges and obstacles. In *Proceeding in Finance and Risk Perspectives '12*; ACRN Cambridge Publishing House: Enns, Austria, 2012; pp. 77–88.
50. Chen, H. The Path Choice of Constructing Supply Chain Finance Cloud Ecosystem Based on Internet. *World Econ. Res.* **2017**, *6*, 71–77. [CrossRef]
51. Chen, X.; Wang, C.; Li, S. The impact of supply chain finance on corporate social responsibility and creating shared value: A case from the emerging economy. *Supply Chain Manag. Int. J.* **2022**. ahead-of-print. [CrossRef]
52. Fellenz, M.R.; Augustenborg, C.; Brady, M.; Greene, J. Requirements for an evolving model of supply chain finance: A technology and service providers perspective. *CIBIMA* **2009**, *10*, 227–235.
53. Song, H.; Chen, S. Development of Supply Chain Finance and Internet Supply Chain Finance: A Theoretical Framework. *J. Renmin Univ. Chin.* **2016**, *30*, 95–104.
54. Gomm, M.L. Supply chain finance: Applying finance theory to supply chain management to enhance finance in supply chains. *Int. J. Logist. Res. Appl.* **2010**, *13*, 133–142. [CrossRef]
55. Randall, W.S.; Theodore, F.M. Supply chain financing: Using cash-to-cash variables to strengthen the supply chain. *Int. J. Phys. Distrib. Logist. Manag.* **2009**, *39*, 669–689. [CrossRef]
56. Hong, Y. Research on Energy Diffusion Modeling and Simulation Analysis of the Core Enterprise of Supply Chain Financial Ecosystem Based on Netlogo. *Int. J. Simul. Syst. Sci. Technol.* **2015**, *16*, 41–45. [CrossRef]
57. Huang, C.; Chan, F.T.S.; Chung, S.H. Recent contributions to supply chain finance: Towards a theoretical and practical research agenda. *Int. J. Prod. Res.* **2022**, *60*, 493–516. [CrossRef]
58. Li, S.; Chen, X. The role of supply chain finance in third-party logistics industry: A case study from China. *Int. J. Logist. Res. Appl.* **2019**, *22*, 154–171. [CrossRef]
59. Chen, X.; Liu, C.; Li, S. The role of supply chain finance in improving the competitive advantage of online retailing enterprises. *Electron. Commer. Res. Appl.* **2019**, *33*, 100821. [CrossRef]
60. Wuttke, D.A.; Blome, C.; Henke, M. Focusing the financial flow of supply chains: An empirical investigation of financial supply chain management. *Int. J. Prod. Econ.* **2013**, *145*, 773–789. [CrossRef]
61. Chen, L.; Moretto, A.; Jia, F.; Caniato, F.; Xiong, Y. The role of digital transformation to empower supply chain finance: Current research status and future research directions (Guest editorial). *Int. J. Oper. Prod. Manag.* **2021**, *41*, 277–288. [CrossRef]
62. Palia, D.; Sopranzetti, B.J. Securitizing Accounts Receivable. *Rev. Quant. Financ. Account.* **2004**, *22*, 29–38. [CrossRef]
63. Berger, A.N.; Udell, G.F. A more complete conceptual framework for SME finance. *J. Bank. Financ.* **2006**, *30*, 2945–2966. [CrossRef]
64. Sugirin, M. Financial supply chain management. *J. Corp. Treas. Manag.* **2009**, *2*, 237–240.
65. Basu, P.; Nair, S.K. Supply Chain Finance enabled early pay: Unlocking trapped value in B2B logistics. *Int. J. Logist. Syst. Manag.* **2012**, *12*, 334–353. [CrossRef]
66. More, D.; Basu, P. Challenges of supply chain finance. *Bus. Process Manag. J.* **2013**, *19*, 624–647. [CrossRef]
67. Ji, G.; Gunasekaran, A. Evolution of innovation and its strategies: From ecological niche models of supply chain clusters. *J. Oper. Res. Soc.* **2014**, *65*, 888–903. [CrossRef]
68. Ali, Z.; Gongbing, B.; Mehreen, A. Predicting supply chain effectiveness through supply chain finance. *Int. J. Logist. Manag.* **2019**, *30*, 488–505. [CrossRef]
69. Chao, X.; Ran, Q.; Chen, J.; Li, T.; Qian, Q.; Ergu, D. Regulatory technology (Reg-Tech) in financial stability supervision: Taxonomy, key methods, applications and future directions. *Int. Rev. Financ. Anal.* **2022**, *80*, 102023. [CrossRef]
70. Gomber, P.; Kauffman, R.J.; Parker, C.; Weber, B.W. On the Fintech Revolution: Interpreting the Forces of Innovation, Disruption, and Transformation in Financial Services. *J. Manag. Inf. Syst.* **2018**, *35*, 220–265. [CrossRef]
71. Palmié, M.; Wincent, J.; Parida, V.; Caglar, U. The evolution of the financial technology ecosystem: An introduction and agenda for future research on disruptive innovations in ecosystems. *Technol. Forecast. Soc. Change* **2020**, *151*, 119779. [CrossRef]
72. Liu, Z. Literature Review of Supply Chain Finance Based on Blockchain Perspective. *OJBM* **2020**, *9*, 419–429. [CrossRef]
73. Cui, Y. Research on the Development of Supply Chain Finance Innovation Assisted by Fintech. In Proceedings of the 5th International Conference on Financial Innovation and Economic Development (ICFIED 2020), Sanya, China, 10–12 January 2020; pp. 189–193.
74. Zhang, Z.Y.; Rohlfer, S.; Rajasekera, J. An Eco-Systematic View of Cross-Sector Fintech: The Case of Alibaba and Tencent. *Sustainability* **2020**, *12*, 8907. [CrossRef]
75. Ning, L.; Yuan, Y. How blockchain impacts the supply chain finance platform business model reconfiguration. *Int. J. Logist. Res. Appl.* **2021**. [CrossRef]
76. De Reuver, M.; Sørensen, C.; Basole, R.C. The Digital Platform: A Research Agenda. *J. Inf. Technol.* **2018**, *33*, 124–135. [CrossRef]

77. Du, M.; Chen, Q.; Xiao, J.; Yang, H.; Ma, H. Supply Chain Finance Innovation Using Blockchain. *IEEE Trans. Eng. Manag.* **2020**, *67*, 1045–1058. [CrossRef]
78. Li, M.; Shao, S.; Ye, Q.; Xu, G.; Huang, G.Q. Blockchain-enabled logistics finance execution platform for capital-constrained E-commerce retail. *Robot. Comput. Integr. Manuf.* **2020**, *65*, 101962. [CrossRef]
79. Wan, X.; Qie, X. Poverty alleviation ecosystem evolutionary game on smart supply chain platform under the government financial platform incentive mechanism. *J. Comput. Appl. Math.* **2020**, *372*, 112595. [CrossRef]
80. Huang, Q.; Zhao, X.; Yeung, K.H.; Ma, L.; Yeung, J.H.Y. Effects of information-processing mechanisms on Internet-based purchase order financing. *Transp. Res. E Logist. Transp. Rev.* **2021**, *146*, 102222. [CrossRef]
81. Camarinha-Matos, L.M.; Afsarmanesh, H. Collaborative networks: A new scientific discipline. *J. Intell. Manuf.* **2005**, *16*, 439–452. [CrossRef]
82. Graça, P.; Camarinha-Matos, L.M. The Need of Performance Indicators for Collaborative Business Ecosystems. In Proceedings of the Technological Innovation for Cloud-Based Engineering Systems, Costa de Caparica, Portugal, 13–15 April 2015; Springer: Cham, Switzerland, 2015; pp. 22–30.
83. Liu, X.; Zhou, L.; Wu, Y.-C.J. Supply Chain Finance in China: Business Innovation and Theory Development. *Sustainability* **2015**, *7*, 14689–14709. [CrossRef]
84. Shi, W.; Mena, C. Supply Chain Resilience Assessment With Financial Considerations: A Bayesian Network-Based Method. *IEEE Trans. Eng. Manag.* **2021**, 1–16. [CrossRef]
85. Song, H.; Yang, X.; Yu, K. How do supply chain network and SMEs' operational capabilities enhance working capital financing? An integrative signaling view. *Int. J. Prod. Econ.* **2020**, *220*, 107447. [CrossRef]
86. Olan, F.; Arakpogun, E.O.; Jayawickrama, U.; Suklan, J.; Liu, S. Sustainable Supply Chain Finance and Supply Networks: The Role of Artificial Intelligence. *IEEE Trans. Eng. Manag.* **2022**, 1–16. [CrossRef]
87. Acharya, V.V. A theory of systemic risk and design of prudential bank regulation. *J. Financ. Stab.* **2009**, *5*, 224–255. [CrossRef]
88. Milne, A. Distance to default and the financial crisis. *J. Financ. Stab.* **2014**, *12*, 26–36. [CrossRef]
89. Kupiec, P.H. Will TLAC regulations fix the G-SIB too-big-to-fail problem? *J. Financ. Stab.* **2016**, *24*, 158–169. [CrossRef]
90. Abedifar, P.; Giudici, P.; Hashem, S.Q. Heterogeneous market structure and systemic risk: Evidence from dual banking systems. *J. Financ. Stab.* **2017**, *33*, 96–119. [CrossRef]
91. Zhang, H.; Shi, Y.; Yang, X.; Zhou, R. A firefly algorithm modified support vector machine for the credit risk assessment of supply chain finance. *Res. Int. Bus. Financ.* **2021**, *58*, 101482. [CrossRef]
92. Wang, G.; Wang, L.; Mohammed, B.S.; Hamad, A.A. An investigation on the risk awareness model and the economic development of the financial sector. *Ann. Oper. Res.* **2022**. [CrossRef]
93. Li, X.; Zhou, P. Research on Risk Management of Digital Currency Based on Blockchain Technology in Mobile Commerce. In Proceedings of the Design, Operation and Evaluation of Mobile Communications, Virtual Event, 24–29 July 2021; Springer: Cham, Switzerland, 2021; pp. 45–67.
94. Tseng, M.L.; Wu, K.J.; Hu, J.; Wang, C.H. Decision-making model for sustainable supply chain finance under uncertainties. *Int. J. Prod. Econ.* **2018**, *205*, 30–36. [CrossRef]
95. Tseng, M.L.; Wu, K.J.; Lim, M.K.; Wong, W.P. Data-driven sustainable supply chain management performance: A hierarchical structure assessment under uncertainties. *J. Clean. Prod.* **2019**, *227*, 760–771. [CrossRef]
96. Jia, F.; Zhang, T.; Chen, L. Sustainable supply chain Finance:Towards a research agenda. *J. Clean. Prod.* **2020**, *243*, 118680. [CrossRef]
97. Kraljic, P. Purchasing must become supply management. *Harv. Bus. Rev.* **1983**, *61*, 109–117.
98. Seifert, D.; Seifert, R.W.; Protopappa, S.M. A review of trade credit literature: Opportunities for research in operations. *Eur. J. Oper. Res.* **2013**, *231*, 245–256. [CrossRef]
99. Viswanadham, N.; Samvedi, A. Multi tier supplier selection for a sustainable global supply chain. In Proceedings of the 2013 IEEE International Conference on Automation Science and Engineering (CASE), Madison, WI, USA, 17–20 August 2013; pp. 492–497.
100. Liu, Q. China's Internet financial ecosystem overview. In Proceedings of the 2015 International Conference on Logistics, Informatics and Service Sciences (LISS), Barcelona, Spain, 27–29 July 2015; pp. 1–4.
101. Chen, F.; Drezner, Z.; Ryan, J.K.; Simchi-Levi, D. Quantifying the Bullwhip Effect in a Simple Supply Chain: The Impact of Forecasting, Lead Times, and Information. *Manag. Sci.* **2000**, *46*, 436–443. [CrossRef]
102. Gligor, D.M.; Holcomb, M. The road to supply chain agility: An RBV perspective on the role of logistics capabilities. *Int. J. Logist. Manag.* **2014**, *25*, 160–179. [CrossRef]
103. Bals, L.; Tate, W.; Gelsomino, L.; Bals, C. The Influence of Financial Flows on Sustainability. In Proceedings of the 28th Annual IPSERA Conference: Art and Science of Procurement, Milan, Italy, 14–17 April 2019; p. 53.
104. Bascompte, J.; Jordano, P.; Olesen, J.M. Asymmetric Coevolutionary Networks Facilitate Biodiversity Maintenance. *Science* **2006**, *312*, 431–433. [CrossRef]
105. Haldane, A.G.; May, R.M. Systemic risk in banking ecosystems. *Nature* **2011**, *469*, 351–355. [CrossRef] [PubMed]
106. Zhang, D.; Hu, M.; Ji, Q. Financial markets under the global pandemic of COVID-19. *Finance Res. Lett.* **2020**, *36*, 101528. [CrossRef]
107. Lund, S.; Manyika, J.; Woetzel, J.; Barriball, E.; Krishnan, M. *Risk, Resilience, and Rebalancing in Global Value Chains*; McKinsey Global Institute: Washington, DC, USA, 2020.