


Review

Science Mapping of the Global Knowledge Base on Microfinance: Influential Authors and Documents, 1989–2019

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Abstract: The use of microfinance in poverty alleviation and, by extension, as an instrument for sustainable social and economic development, represents a novel idea in sustainable finance. This study employed science mapping to examine 4049 Scopus-indexed documents explicitly concerned with microfinance. The goals of the review were to document the distribution of microfinance literature by type, volume, time, and geography, and to identify influential authors, articles, and a potential intellectual structure of this knowledge base. The first microfinance research was conducted in 1989, but the field attracted increased attention only after 2006, when the Nobel Peace Prize was awarded to microfinance pioneer Muhammad Yunus. This study does not find any single dominant school of thought in the field of microfinance, but rather identified three thematic research clusters: (1) a concentration on institutional aspects of microfinance, (2) scholars who used sophisticated research methods to evaluate the impact of microfinance, and (3) groundbreaking microfinance literature related to social justice more generally. As the first-ever, comprehensive bibliometric review of research on microfinance, this study provides benchmarks against which to assess the future evolution of this literature, a reference for scholars entering this domain, and targets for future development of this field of sustainability scholarship.

Keywords: microfinance; microcredit; sustainable finance; sustainability; science mapping; bibliometric review

1. Introduction

Microfinance originated to provide the poor in the developing world a basis for self-determination through entrepreneurship, and to motivate them to move towards new goals and a sustainable future. Consequently, microfinance can be conceptualized as a powerful preventive mechanism through which societies can reduce problems that threaten social, cultural, and economic sustainability, such as forced human migration, cultural conflicts, and political unrest [1].

Microfinance first emerged in the 1970s but attracted scant attention for the next three decades [2–5]. It was the Bangladeshi Nobel Peace Prize winner, Muhammad Yunus, who first popularized the concept in the beginning of the twenty-first century. Yunus founded one of the first significant microfinance institutions (MFIs) in Bangladesh, which served as a model that spread throughout the world. Today microfinance is perceived as a financial instrument that contributes to sustainable social and economic development [1,4,6–18]. In the last four years, the use of microfinance has migrated into the domain of environmental sustainability (‘green microfinance’) as well [19–31]. Microfinance aims to help the poor on their path to an independent life and to achieve social justice. Hence, microfinance is an important tool within the broader academic domains of finance and sustainability.

The significance of microfinance was further underscored by the United Nations’ (UN) adoption of microfinance within its global Sustainable Development Goals (SDGs) of 2012 [32]. SDG 1 incorporates

access to financial products and services, and SDG 17 targets the local availability of financial resources as foundations for sustainable development [33]. The SDGs are also part of the UN Agenda 2030 [32]. The UN Capital Development Fund supports several specific initiatives, such as ‘last mile finance’, women’s empowerment through credit availability, and rural development with micro-financed investment and the entrepreneurship to implement these SDGs [34].

Long before the SDGs succeeded the UN Millennium Development Goals in 2012, the UN Economics and Social Council had declared the year 2005 as the “International Year of Microcredit” [35]. According to Jonathan Morduch, chair of the UN Expert Group on poverty statistics, “microfinance stands as one of the most promising and cost-effective tools in the fight against global poverty” [36].

The purpose of this review of research is to document the growth and evolution of research on microfinance. It aims to analyze a significant portion of the accumulated knowledge base published on microfinance. More specifically, this review addresses the following research questions:

RQ1: How is the global microfinance literature distributed by type and volume over time, and by geography?

RQ2: Which authors have the most significant influence on global microfinance research, and what is the intellectual structure of the knowledge base?

RQ3: Which publications have the most significant influence on global microfinance research?

This study is the first comprehensive bibliometric review of research on microfinance based on documents extracted from the Scopus database [37,38]. We examined 4049 Scopus-indexed documents related to microfinance. Bibliometric methods were used to analyze meta-data associated with these documents. Analyses included descriptive statistics, citation analysis, and co-citation analysis.

The review builds explicitly on another recent review of microfinance research [39]. The current report is distinguished through its examination of a larger database of documents covering a broader topical definition, over a longer span of time. Thus, this study seeks to provide a set of bibliometric benchmarks against which the future evolution of research on microfinance can be assessed.

2. Materials and Methods

Bibliometric reviews generate a comprehensive picture of the existing knowledge base within a broad discipline or a more narrowly defined line of inquiry (e.g., microfinance) [40–42]. While bibliometric review, also known as science mapping, has been applied across an increasing range of disciplines [37,43–45], applications in finance and sustainability are quite recent. In this review, the quantitative tools of science mapping, a special form of bibliometric analysis [21,46,47], are applied to analyze the global knowledge base on microfinance.

2.1. Search Criteria and Identification of Sources

Using the ‘Preferred Reporting Items for Systematic Reviews and Meta-Analyses’ (PRISMA) guidelines for systematic research reviews [48], the document identification and selection process for the dataset is shown in Figure 1. Journal articles, books, book chapters, conference proceedings, and trade publications were included in the search.

Initially, there were 4491 search results using the search string “TITLE-ABS-KEY (microfinance OR microcredit)”. The search string “TITLE-ABS-KEY (microenterprise AND credit)” was also applied, which generated 172 additional articles. All other variations of the search terms, such as “micro finance”, “micro-finance”, and synonyms, like “microenterprise” and “micro-entrepreneur”, or “microbank” and “microfinance institution”/“MFI” were used as well.

“Microinsurance” was not searched, as it is a specific field that is not concerned with financing entrepreneurship to fight poverty. Thus, given this review’s interest in sustainability, the term was not used. “Financial inclusion” was also not used, since it connotes a broader scope than “microfinance” and includes the provision of basic financial services (e.g., access to a bank account). Similarly, the keyword “financial cooperatives” was included. Financial cooperatives are intermediaries owned

by its members, while they can engage in microfinance activities, but do not necessarily do so. Thus, searches based on this keyword were considered inappropriate. For the sake of simplicity, the term “microfinance” is used throughout this paper to describe the results of the applied searches.

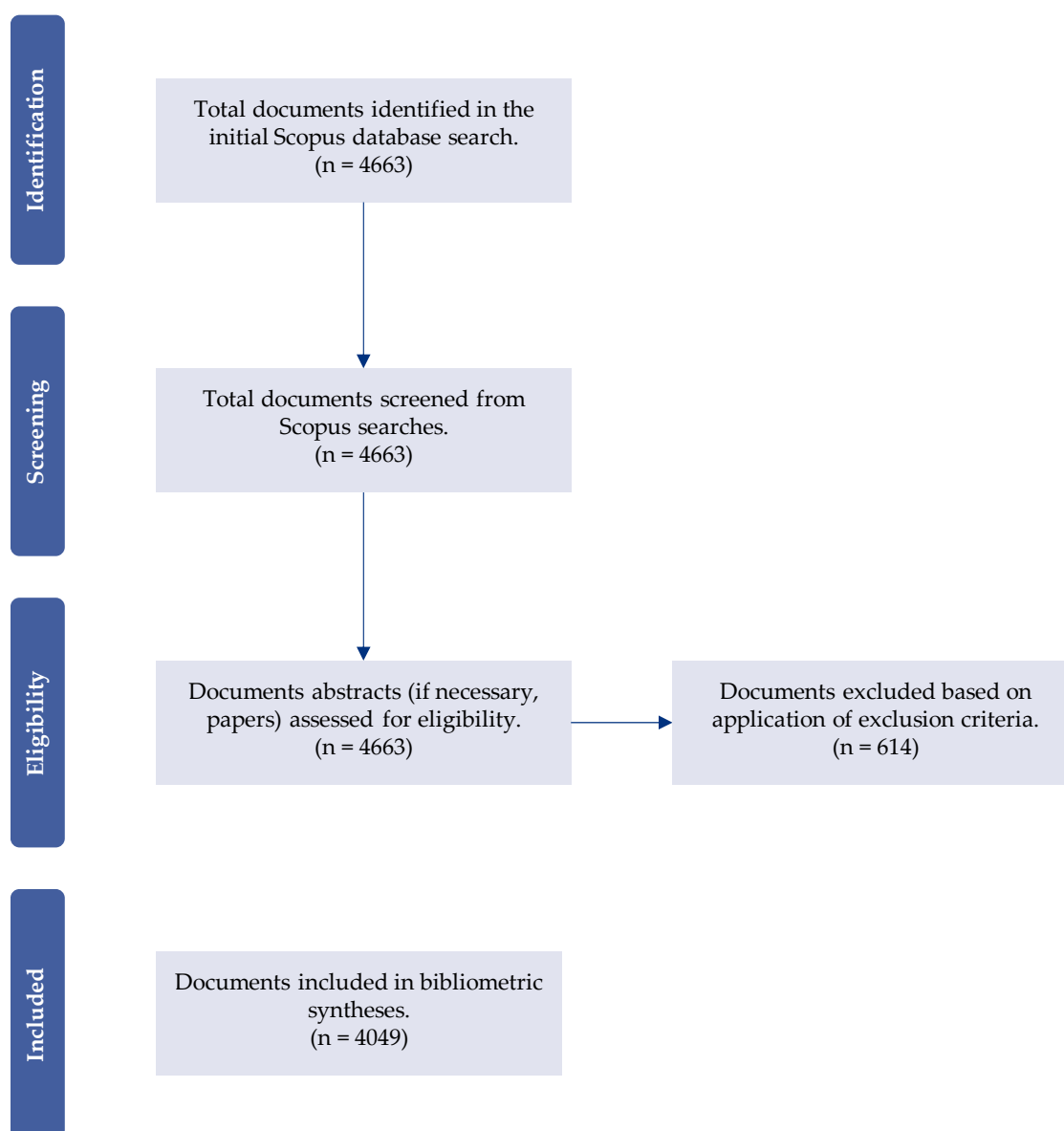


Figure 1. PRISMA flow diagram detailing steps in the screening of sources for the global microfinance review.

The abstracts of all papers in this search list were reviewed to examine whether the research is clearly related to microfinance. Where the abstract analysis did not yield clear results, the entire papers were analyzed. For instance, papers with the words “that the current financial crisis offers banks the possibility to rethink their societal role and move from a compliance approach to CSR to a more strategic one” [49] (p. 1) or “risks associated with income variability can also be reduced by diversifying farm production between crops and livestock, on the one hand, and between a mix of different crops (cereals, vegetables, fruits), on the other” [50] (p. 1) appeared in the initial search results, but were removed from further analysis because no clear link to the topic ‘microfinance’ could be identified.

2.2. Data Extraction

Scopus limits the number of documents in 'saved lists' to 2000. Owing to the large volume of documents in the database and the use of various search strings, four saved lists were exported from Scopus as comma-separated value (csv) files. Next, the copies of the csv files were saved as Excel spreadsheets, to conduct further analysis (e.g., distribution of the microfinance research over time, search for co-cited document titles).

Since bibliometric analysis relies on meta-data downloaded from Scopus, the reliability of all data analyses depends on the quality of these bibliographic data. One threat to the reliability of bibliometric analyses lies in the lack of consistency in names of authors, references, nations, and other data meta-data exported from Scopus. Thus, the author developed thesaurus files designed to 'disambiguate' the data. For example, it is quite common to find Peter R. Jones referred to variously as 'Jones, P.' and 'Jones, P.R.', or the United States referred to variously as 'USA', 'United States', 'United States of America', and 'America' in a downloaded Scopus database. Thus, the author created a set of thesaurus files for insertion into the analytical software in order to ensure accurate results.

2.3. Data Analysis

Descriptive analysis and science mapping were the quantitative tools used for the analysis. Descriptive analysis illustrates the composition of a database by type, volume, and over time. Science mapping performs both citation and co-citation analysis. Citation analysis identifies the total number of document citations by other Scopus-indexed documents. This is often accepted as a measure of scholarly influence. In this review, a 'citations per document' (CPD) metric was also calculated in order to compensate for differences in the length of time a document (or author) has had to accumulate citations.

VOSviewer (Centre for Science and Technology Studies, Leiden University, Leiden, Netherlands; version 1.6.10; 10 January 2019), the main software program used for this bibliometric review, conducts a variety of social network analyses that visualize similarities (VOS) among documents, authors, journals or topics that comprise a literature. VOSviewer has been used widely in order to gain insights into the structural features of disciplines [42].

One type of VOS analysis employed in this review was 'co-citation analysis'. Co-citation is defined as the frequency with which two documents or two authors are cited together in other sources [47]. Consider for example, documents co-citation analysis. If three documents—X, Y, and Z—each cite papers A and B, then A and B are treated as co-cited documents. In this example, documents A and B would each accumulate three co-citations [42]. Although co-citation analysis can be applied to documents, authors, or journals, in this review its application was limited to authors and documents.

Two important features distinguish co-citation analysis from citation analysis. First, co-citation analysis examines the reference lists of all documents included in the reviewer's database (e.g., 4049 documents). It then creates a matrix of all these references as the basis for the calculation of co-citations. Thus, co-citation analysis captures a far larger portion of the literature than citation analysis which is limited to documents included in the selected document repository. This suggests that it offers a much broader assessment of scholarly influence.

Second, frequent co-citation of two documents by other documents (i.e., scholars) indicates a similarity in intellectual affiliation between the two documents. If we assume, for example, that two documents or authors have been co-cited together 5, 50, 100, or 300 times by other documents or authors, it would suggest different degrees of intellectual affiliation. Thus, co-citation has also been used to develop measures of 'similarity' between authors, or documents.

Co-citation has been widely used to scientifically map the knowledge base of various academic disciplines [40,41,43–45,51,52]. VOSviewer not only generates 'co-citation counts' that can be used as measures of scholarly influence, but also 'co-citation maps' that 'visualize' similarities among authors, or documents. For example, author co-citation analysis maps can be used to highlight the different research clusters that comprise the intellectual structure of the knowledge base. Both uses

of co-citation analysis are used in this review. Finally, it should be noted that citation and co-citation analysis, when used together, provide a powerful complementary means of gaining insights into a body of knowledge.

3. Results

This section presents the science mapping of the knowledge base on microfinance. The results are highlighted according to the three research questions that guide this paper.

3.1. Distribution of Microfinance Literature by Type, Volume, Time, and Geography

The knowledge base selected for this review is comprised of 3396 journal articles (84%), 476 books or book chapters (12%), 154 conference proceedings (4%), and 23 trade publications or documents of undefined type (1%). This represents a substantial corpus of studies, especially when one considers the fairly narrow scope of this review (i.e., microfinance) and that most of this literature has accumulated in the past 20 years.

RQ1 seeks to trace the history of microfinance research around the world. A total of 4015 documents in the database represent the entire body of microfinance knowledge until the end of 2018 (Figure 2).

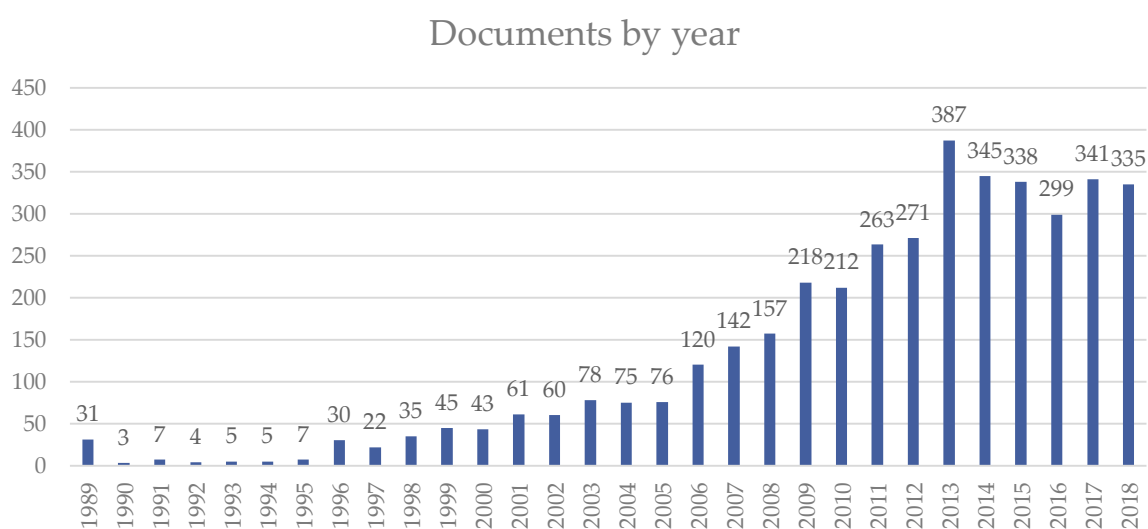


Figure 2. Distribution of Scopus-indexed microfinance literature by volume and time 1989–2018.

The first Scopus-indexed research on microfinance was published in 1989. The literature was launched in a series of book chapters linking women’s empowerment and microfinance in the book “Women’s Ventures” [53–66] and in several related conference proceedings on “Microenterprises in developing countries” [67–82]. Subsequently, however, only a handful of studies were published annually until 1996 (see Figure 2). Slow, gradual increase in the annual volume of publications was observed for the next decade, until 2006, when the Nobel Peace Prize was awarded to the microcredit pioneer Muhammad Yunus. Yunus was a social entrepreneur and founder of Grameen Bank [83] in Bangladesh, one of the first market-based MFIs. Yunus and his colleagues were recognized “for their efforts through microcredit to create economic and social development from below” [84]. After this, there was a surge in the number of scholarly publications in the field of microfinance. Microfinance is a relatively new domain in scholarly studies. During the past decade, there have been almost 300 publications published on average per year.

The ‘heat map’ in Figure 3 reveals a clear dominance of authors affiliated in the United States. They contribute over one fourth to the whole body of worldwide microfinance knowledge. Together with scholars from the United Kingdom, the share amounts even to 37%, and to 44% including

Hargreaves [105,109], Kim [108,109], Morison [105,110], and Watts [106,108], or to the topic of women's empowerment, for example, Rankin [111,112].

Table 1. Rank order of the 20 most highly-cited authors on microfinance, 1989–2019 (n = 4049).

Rank	Author	Topical Focus	Country	Docs	Scopus Citations	CPD ¹
1	Morduch J.	Institutional	US ²	27	2999	111
2	Phetla G.	Health	SA ³	7	1130	161
3	Busza J.	Health	UK ⁴	6	1103	184
4	Hargreaves J. R.	Health	UK	7	1094	156
5	Kim J. C.	Health	US	6	1051	175
6	Morison L. A.	Health	UK	6	1051	175
7	Hulme D.	Poverty in General	UK	17	1008	59
8	Mersland R.	Institutional	NO ⁵	44	964	22
9	Watts C.	Health	UK	7	872	125
10	Khandker S. R.	Poverty in General	US	13	854	66
11	Mosley P.	Poverty in General	UK	18	844	47
12	Pronyk P. M.	Health	US	6	835	139
13	Karlan D.	Impact	US	20	822	41
14	Cull R.	Institutional	US	12	729	61
15	Demirguc-Kunt A.	Institutional	US	6	691	115
16	Hartarska V.	Institutional	US	20	626	31
17	Rankin K. N.	Women's Empowerment	CA ⁶	8	623	78
18	Rutherford S.	Poverty in General	UK	7	615	88
19	Lensink R.	Institutional	NL ⁷	21	611	29
20	Hermes N.	Institutional	NL	15	542	36

¹ CPD = Citations Per Document; ² US = United States; ³ SA = South Africa; ⁴ UK = United Kingdom; ⁵ NO = Norway; ⁶ CA = Canada; ⁷ NL = Netherlands.

A very homogenous picture emerges in terms of the geographical distribution of the key scholars. Sixteen out of the 20 most highly-productive authors are located in North America or the UK, two in the Netherlands, and one each in Norway and South Africa. These findings are in concert with the global 'heat map' analyzed above (Figure 3), which showed a share of more than 40% North American or UK-based microfinance scholarship in history. Additionally (not specifically listed in the table), five of the top-cited scholars are affiliated with non-university institutions that explicitly engage in catalyzing sustainable development, namely The World Bank and the UN [33–35,113].

Next, co-citation analysis was used to identify the highly influential scholars. As noted earlier, co-citation analysis has the capacity to capture a broader literature by analyzing the reference lists of the 4049 documents in our review database. The results displayed in Table 2 show that the total co-citations and total link strength (a measure of connections of authors to other authors) are quite substantial. This offers further evidence of the interconnectedness (i.e., high level of co-citation among authors) of this literature.

Moreover, because co-citation analysis goes beyond documents in the underlying database, Table 2 identifies a number of additional influential authors in the microfinance literature (i.e., Armendariz, Banerjee, Hashemi, Yunus, Duflo, Stiglitz, Pitt, Kabeer, and Schreiner). For example, Stiglitz is listed here because of his publication on *Peer monitoring and credit markets* [114], which was not included in the review dataset. This highly-cited paper from 1990 examined research on peer lending and was subsequently cited frequently by scholars investigating microfinance.

Synthesis of the results shown in Tables 1 and 2 allow us to identify influential authors through the complementary perspectives offered by citation and co-citation analysis. First we wish to note the asterisked authors in Table 2, highlighting scholars who were among the top 20 authors in both citation and co-citation analysis. These include Morduch [86,87,115], Khandker [98,116], Karlan [103,117], Mersland [90,118], Demirguc-Kunt [87,119], Hulme [96,100], Mosley [83,100],

Cull [87,120], Lensink [93,95], Hartaska [91,92], and Hermes [93,95]. We can conclude that these have been particularly influential scholars in this literature.

Table 2. Rank order of the 20 most highly co-cited authors on microfinance, 1989–2019.

Rank	Author	School of Thought (Cluster in Figure 4)	Co-Citations	Total Link Strength
1	*Morduch J.	Institutional Aspects	3269	86,004
2	*Khandker S. R.	Social Justice	1352	32,118
3	*Karlan D.	Impact and Sustainability	1182	36,521
4	*Mersland R.	Institutional Aspects	1154	31,651
5	*Demirguc-Kunt A.	Institutional Aspects	1017	31,508
6	*Hulme D.	Social Justice	1000	22,655
7	Armendariz B.	Institutional Aspects	842	24,080
8	Banerjee A.	Impact and Sustainability	783	23,298
9	*Mosley P.	Social Justice	770	17,730
10	*Cull R.	Institutional Aspects	755	24,345
11	Hashemi S.	Social Justice	723	15,742
12	Yunus M.	Social Justice	723	14,484
13	Duflo E.	Impact and Sustainability	696	19,627
14	Stiglitz J.	Impact and Sustainability	695	18,855
15	*Lensink R.	Institutional Aspects	685	20,474
16	Pitt M.	Social Justice	654	17,071
17	*Hartarska V.	Institutional Aspects	608	16,723
18	Kabeer N.	Social Justice	589	12,422
19	Schreiner M.	Institutional Aspects	579	13,088
20	*Hermes N.	Institutional Aspects	563	16,510

* Scholars also listed in Table 1 of top 20 cited scholars in microfinance.

Next, we used VOSviewer to generate an author co-citation map. The author co-citation network derived from the review database consisted of 70,988 authors. Using a threshold of at least 20 co-citations per author we set VOSviewer to display the 90 most highly co-cited authors in a social network map (see Figure 4). The software organizes authors in the co-citation network into clusters based on their level of co-citation. Authors who are frequently co-cited are closer to one another in proximity. These connections are also indicated by the ‘links’ between specific nodes. Node size reflects the relative number of author co-citations. Finally, the software creates ‘clusters’ of authors based upon analysis of co-citation frequency. The clusters are interpreted as schools of thought that together comprise the intellectual structure of the knowledge base [40].

The largest node on the map belongs to Morduch [2,86,115] reflecting the high level of co-citations of his scholarship with other scholars in this literature. Morduch’s central location on map and high density of links to authors in all three clusters (see also ‘link strength’ in Table 2) affirm his status as the key ‘boundary-spanning scholar’ in this literature [40]. Boundary-spanning scholars play a key role in the development of a knowledge base by interpreting and synthesizing ideas across different schools of thought.

The author co-citation map is comprised of three coherent, distinct, but densely interconnected clusters. We conclude that this literature is comprised of clearly defined schools of thought, consisting of authors whose scholarship is frequently co-cited. These schools of thought include ‘Impact and Sustainability of Microfinance’ (green cluster), ‘Institutional Aspects of Microfinance’ (red cluster), and ‘Microfinance and Social Justice’ (blue cluster).

Table 3. Illustrative selection of highly-cited documents authored by scholars in the school of thought focusing on Institutional Aspects of Microfinance.

Author(s)	Document	Scopus Citations	CPD ¹
Morduch (2000)	The microfinance schism [86]	333	18
Cull et al. (2007)	Financial performance and outreach [87]	332	28
Cull et al. (2009)	Microfinance meets the market [119]	244	24
Hermes et al. (2011)	Outreach and efficiency of microfinance institutions [95]	192	24
Mersland and Strom (2009)	Performance and governance in microfinance institutions [90]	185	19
Hartarska (2005)	Governance and performance of microfinance institutions in Central and Eastern Europe ... [91]	154	11
Hartarska and Nadolnyak (2007)	Do regulated microfinance institutions achieve better sustainability and outreach? Cross-country evidence [92]	151	13
Navajas et al. (2000)	Microcredit and the poorest of the poor: Theory and evidence from Bolivia [136]	143	8
Hermes and Lensink (2007)	The empirics of microfinance: What do we know? [93]	130	11
Schreiner (2002)	Aspects of outreach: A framework for discussion of the social benefits of microfinance [137]	114	7
Hermes and Lensink (2011)	Microfinance: Its impact, outreach, and sustainability [94]	105	13
Cull et al. (2011)	Does regulatory supervision curtail microfinance profitability and outreach? [120]	90	11
Caudill et al. (2009)	Which microfinance institutions are becoming more cost effective with time? [138]	73	7
Armendariz and Szafarz (2011)	On mission drift in microfinance institutions [121]	67	8

¹ CPD = Citations Per Document.

Table 4. Illustrative selection of highly-cited documents authored by scholars in the school of thought focusing on the Impact of Microfinance.

Author(s)	Document	Scopus Citations	CPD ¹
Stiglitz (1990)	Peer monitoring and credit markets [114]	484	17
Banerjee et al. (2013)	The diffusion of microfinance [124]	206	34
Banerjee et al. (1994)	Thy neighbor's keeper: The design of a credit cooperative with theory and a test [125]	195	8
Karlan (2005)	Using experimental economics to measure social capital and predict financial decisions [103]	184	13
Karlan and Zinman (2010)	Expanding credit access: Using randomized supply decisions to estimate the impacts [117]	167	19
Banerjee et al. (2015)	The miracle of microfinance? Evidence from a randomized evaluation [126]	155	39
Banerjee et al. (2015)	Six randomized evaluations of microcredit: Introduction and further steps [139]	124	31
Karlan and Zinman (2011)	Microcredit in theory and practice: Using randomized credit scoring for impact evaluation [104]	116	15

¹ CPD = Citations Per Document.

Table 5. Illustrative selection of highly-cited documents authored by scholars in the school of thought focusing on Microfinance and Social Justice.

Author(s)	Document	Scopus Citations	CPD ¹
Pitt and Khandker (1998)	The impact of group-based credit programs on poor households in Bangladesh: Does gender matter? [116]	539	26
Hashemi et al. (1996)	Rural credit programs and women's empowerment in Bangladesh [127]	467	20
Kabeer (2001)	Conflicts over credit: Re-evaluating the empowerment potential of loans to women in rural Bangladesh [133]	388	22
Yunus et al. (2010)	Building social business models [129]	356	40
Khandker (2005)	Microfinance and poverty [98]	339	24
Hulme and Shepherd (2003)	Conceptualizing chronic poverty [96]	305	19
Khandker (1998)	Fighting poverty with microcredit [99]	247	12
Schuler and Hashemi (1994)	Credit programs, women's empowerment, and contraceptive use in rural Bangladesh [128]	198	8
Schuler et al. (1998)	Men's violence against women in rural Bangladesh [134]	137	7
Pitt et al. (2006)	Empowering women with micro finance [131]	127	10
Mosley and Hulme (1998)	Microenterprise finance: is there a conflict between growth and poverty alleviation? [97]	126	6
Schuler et al. (1997)	The influence of women's changing roles and status in Bangladesh's fertility transition [135]	110	5
Matin et al. (1997)	Finance for the poor [101]	72	4

¹ CPD = Citations Per Document.

3.3. Analysis of Influential Documents

The final research question (RQ3) inquired into the most influential papers written on microfinance. Table 6 lists the 20 most highly-cited documents on microfinance. Morduch's groundbreaking conceptual research *The microfinance promise* [115] is at the top of the list. Although the top-cited papers are split almost evenly between conceptual and empirical papers, the empirical studies tend to be of more recent vintage. Given the significant amount of sophisticated empirical research contained in this knowledge base, only one review of research was listed among the top-cited documents [140]. That paper focused solely on the relationship between poverty and mental disorder. We conclude a gap in the literature.

Table 6. Rank order of the 20 most highly-cited documents on microfinance, 1989-2019 (n = 4049).

Rank	Document	Topical Focus	Type ¹ of Paper	Scopus Citations
1	Morduch (1999). <i>The microfinance promise</i> . [115]	Comprehensive	Con	795
2	Pretty and Ward (2001). <i>Social capital and the environment</i> . [18]	Environment	Con	761
3	Pretty (2003). <i>Social Capital and the Collective Management of Resources</i> . [17]	Environment	Con	731
4	Battilana and Dorado (2010). <i>Building sustainable hybrid organizations</i> . [141]	MFI's	Con	699
5	Patel and Kleinman (2003). <i>Poverty and common mental disorders in developing countries</i> . [140]	Health	Rev	542
6	Pitt and Khandker (1998). <i>The Impact of Group-Based Credit Programs on Poor Households in Bangladesh</i> . [116]	Poverty in General	Emp	540
7	Collins et al. (2009). <i>Portfolios of the poor: How the world's poor live on \$2 a day</i> . [102]	Poverty in General	Emp	501
8	Pronyk et al. (2006). <i>Effect of a structural intervention for the prevention of intimate-partner violence and HIV in rural South Africa</i> . [106]	Health	Emp	489
9	Hashemi et al. (1996). <i>Rural Credit Programs and Women's Empowerment in Bangladesh</i> . [127]	Women's Empowerment	Emp	467
10	Kabeer (2001). <i>Conflicts over credit: Re-evaluating the empowerment potential of loans to women in rural Bangladesh</i> . [133]	Women's Empowerment	Emp	388
11	Vertovec (2004). <i>Migrant transnationalism and modes of transformation</i> . [142]	Migration	Con	379
12	Pretty et al. (2011). <i>Sustainable intensification in African agriculture</i> . [143]	Environment	Emp	377
13	Hulme and Mosley (1996). <i>Finance against poverty</i> . [100]	Poverty in General	Con	362
14	Yunus et al. (2010). <i>Building social business models: Lessons from the Grameen experience</i> . [129]	Comprehensive/MFI's	Con	356
15	Khandker (2005). <i>Microfinance and poverty</i> . [98]	Poverty in General	Emp	339
16	Morduch (2000). <i>The microfinance schism</i> . [86]	MFI's	Con	333
17	Cull et al. (2007). <i>Financial performance and outreach: A global analysis of leading microbanks</i> . [87]	MFI's	Emp	332
18	Rahman (1999). <i>Micro-credit initiatives for equitable and sustainable development: Who pays?</i> [144]	MFI's	Emp	317
19	Hulme and Shepherd (2003). <i>Conceptualizing chronic poverty</i> . [96]	Poverty in General	Con	305
20	Rankin (2001). <i>Governing development: Neoliberalism, microcredit, and rational economic woman</i> . [112]	Women's Empowerment	Con	300

¹ Type: Con = Conceptual; Rev = Review; Emp = Empirical.

The list of key documents does not demonstrate a dominant topical focus. Six of them are grounded in a comprehensive view on microfinance and MFI's, five in overall poverty, three each in environmental issues and women's empowerment, two in medical issues, and one in the topic of migration.

In the next step, documents co-citation analysis was conducted to complement the initial findings from citation analysis. For this analysis we relied on the document co-citation to reveal highly co-cited documents and additional relational features of the microfinance knowledge base [41]. The majority of co-cited documents listed in Table 7 is empirical (16 of 20). Consequently, most of the documents focus on 'Impact and Sustainability' (red cluster; nine out of ten). Six publications concentrate on 'Microfinance and Social Justice' (blue cluster), and the remaining five investigate 'Group/Peer Lending and Repayment'. The three microfinance clusters are distributed over all the ranks of the table, which is why there is no influential focus that stands out.

Table 7. Rank order of the 20 most highly co-cited documents on microfinance, 1989–2019.

Rank	Document	Cluster	Type ¹	Co-Citations
1	*Morduch (1999). The microfinance promise. [115]	Green	Con	322
2	*Morduch (2000). The microfinance schism. [86]	Red	Con	158
3	Besley and Coate (1995). Who takes the credit? Gender, power, and control over loan use in rural credit programs in Bangladesh. [145]	Green	Emp	139
4	*Hulme and Mosley (1996). Finance against poverty. [100]	Blue	Con	133
5	Armendariz and Morduch (2010). The economics of microfinance. [2]	Green	Con	127
6	Goetz and Sen Gupta (1996). Who takes the credit? Gender, power, and control over loan use in rural credit programs in Bangladesh. [146]	Blue	Emp	126
7	*Kabeer (2001). Conflicts over credit: Re-evaluating the empowerment potential of loans to women in rural Bangladesh. [133]	Blue	Emp	118
8	*Hashemi et al. (1996). Rural Credit Programs and Women's Empowerment in Bangladesh. [127]	Blue	Emp	108
9	Hartarska (2005). Governance and performance of microfinance institutions in Central and Eastern Europe and the Newly Independent States. [91]	Red	Emp	107
10	Hermes et al. (2011). Outreach and Efficiency of Microfinance Institutions. [95]	Red	Emp	105
11	*Cull et al. (2009). Microfinance meets the market. [119]	Red	Emp	100
12	Mersland and Strom (2010). Microfinance Mission Drift? [118]	Red	Emp	96
13	*Rahman (1999). Micro-credit initiatives for equitable and sustainable development: Who pays? [144]	Blue	Emp	96
14	Stiglitz (1990). Peer monitoring and credit markets. [114]	Green	Emp	96
15	Ahlin et al. (2011). Where does microfinance flourish? Microfinance institution performance in macroeconomic context. [147]	Red	Emp	90
16	Hartarska and Nadolnyak (2007). Do regulated microfinance institutions achieve better sustainability and outreach? [92]	Red	Emp	90
17	Cull et al. (2007). Financial performance and outreach: A global analysis of leading microbanks. [87]	Red	Emp	88
18	*Collins et al. (2009). Portfolios of the poor: How the world's poor live on \$2 a day. [102]	Blue	Emp	73
19	Mersland and Strom (2009). Performance and governance in microfinance institutions. [90]	Red	Emp	73
20	Sharma and Zeller (1997). Repayment performance in group-based credit programs in Bangladesh: An empirical analysis. [148]	Green	Emp	69

* Documents also listed in Table 6 of top 20 cited documents on microfinance; ¹Type: Con = Conceptual; Emp = Empirical.

Document co-citation maps are used to reveal the cognitive structure of a knowledge base [44]. In a document co-citation map, each document is treated as an 'idea'. Clusters of frequently co-cited documents reflect common sets and are interpreted as representing themes or sub-fields within the literature. Interpretation of the document co-citation map follows similar guidelines as the author co-citation map with respect to nodes, links, proximity, and cluster structure.

The microfinance document co-citation network consisted of 128,284 cited references extracted from the 4049 documents in our review database. The VOSviewer citation threshold was set at 20 citations with a display of 50 cited references. The document co-citation map (see Figure 5) reveals three distinctive clusters that comprise the cognitive structure of the global microfinance literature.

1. Publications focusing on efficiency, outreach, performance, and sustainability of microfinance and MFIs (red cluster, 'Impact and Sustainability of Microfinance')
2. Research dealing with the repayment performance of group and peer lending (green cluster, 'Group/Peer Lending and Repayment')
3. Documents on poverty alleviation, rural development, as well as equality, empowerment, and gender issues (blue cluster, 'Microfinance and Social Justice')

These three clusters bear a striking resemblance to those surfaced through the author co-citation analysis. Indeed, two of the cluster themes are identical (i.e., 'Impact and Sustainability of Microfinance' and 'Microfinance and Social Justice'). Notably, this degree of overlap is not always the case. Thus, this result suggests the stability, coherence, and significance of these themes within the microfinance literature.

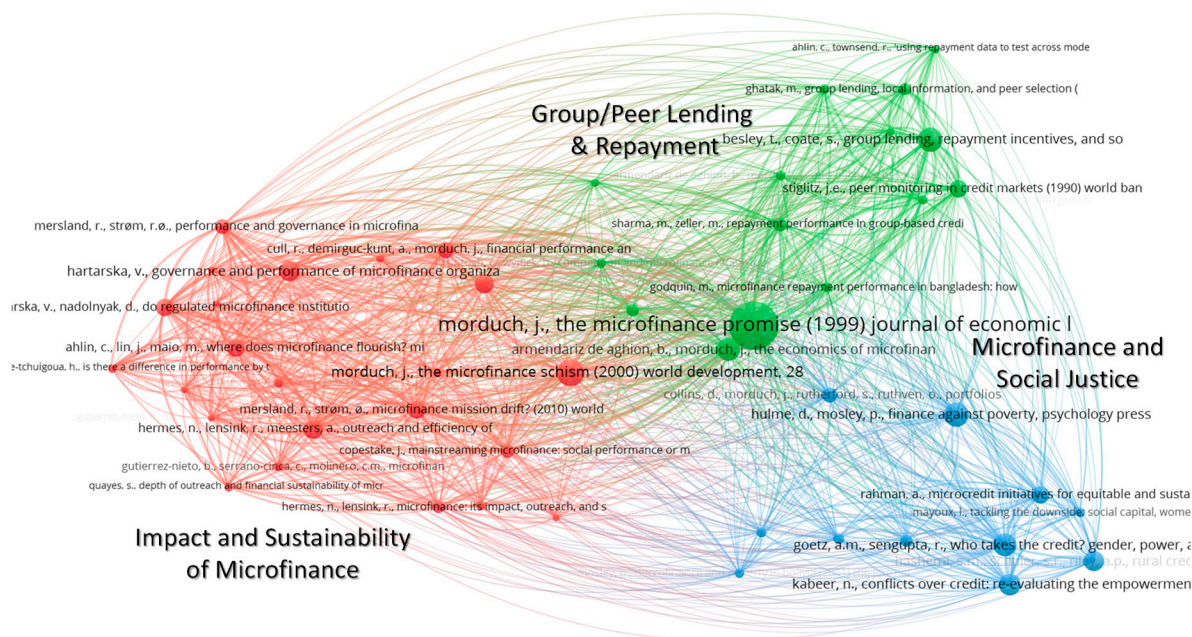


Figure 5. Document co-citation analysis of the global microfinance literature, 1989–2019 (threshold 20 co-citations, 128,284 cited references in the network, display 50 documents).

Morduch's *The microfinance promise* [115] shows the maximum influence as denoted by the largest dot and is located in the center of the map in a triangle showing all three topical clusters. His paper *The microfinance schism* [86] with the second largest dot, has a similar cross-cluster role. The documents ranked third [145] and fourth [100] are positioned peripherally on the map, rather than centrally within their respective clusters. Once again, it is Morduch, who co-authored the fifth most influential paper [2] (with Armendariz), located right in the center—between the two of his other mentioned documents. Even though the three clusters show a high internal density of document co-citation, they are densely interconnected (especially the red and green nodes).

4. Discussion

Microfinance stands as one of the most significant global financial initiatives undertaken to alleviate poverty in developing societies. From the outset, microfinance was conceptualized as a means of creating sustainable income production for women and families living in poor rural communities. Thus, it holds a special place among the range of strategies engaged to foster social and economic sustainability.

This research review employed science mapping to enhance our understanding of the knowledge base in microfinance. The review employed bibliometric analysis of 4049 Scopus-indexed documents in order to gain insights into the evolution of research on microfinance. It should be noted that science mapping reviews neither examine the quality of specific studies, nor do they seek to synthesize substantive findings from a body of literature. Instead, they aim to document the composition and intellectual structure of the knowledge base that has evolved over time. Therefore, an important goal of science mapping is to identify productive directions for future research.

Descriptive analyses of the microfinance knowledge base revealed a substantial body of knowledge consisting of just over four thousand Scopus-indexed documents. Given the rather narrow definition used to guide the selection of documents for this review, this represents an impressive corpus. Moreover, given the delimitation of this review to Scopus, our database does not even represent the entire knowledge base. Longitudinal analysis of the database found that although the first articles on microfinance were authored in 1989, 87% of the 4049 Scopus-indexed documents were published since 2005. This is, without question, a sub-field of finance and sustainability research that has gained acceptance among a significant group of finance and economics scholars. These conclusions drew

further support from the copious citation analysis conducted in this review. Both citation and co-citation analyses of authors and documents confirmed a pattern of strong citation impact.

The 'heat map' of global microfinance scholarship indicates a clear pattern in which the microfinance literature is dominated by scholars in the US and the UK. While this has yielded considerable progress to date, the recruitment of more scholars located in the societies where this research is being conducted could be a relevant priority in this field. In addition to the US and the UK, there is some minor concentration in India, Malaysia, France, Canada, Australia, Germany, Belgium, and Bangladesh. All the mentioned societies altogether account for almost one half of the global scholarship on microfinance. Regarding the other half, we see a relatively wide dispersion over the world. The comprehensive Anglo-American dominance could also be confirmed by identifying the 20 most highly-cited authors. Sixteen of those key scholars are affiliated in North America or the UK.

The main goals of this review were to identify key authors and documents, and then to analyze the intellectual structure of the knowledge base on microfinance. In terms of influential scholars, two stand out. First, Muhammad Yunus deserves recognition as the pioneering scholar in this field. His early work that won the Nobel Prize does not, however, represent his only contribution [75,130,149–154]. The second scholar whose contributions deserve special recognition is Jonathan Morduch who was the most highly-cited and co-cited scholar in the microfinance knowledge base. This was further affirmed by the author co-citation map where his central position highlighted his role as the key 'boundary-spanning scholar' connecting the three schools of thought that comprise the microfinance knowledge base. These findings were complemented by a similar pattern of results from the document citation and co-citation analyses. Not only did Morduch rise to the top of both document citation lists (see Tables 6 and 7), but his groundbreaking conceptual paper, *The microfinance promise* [115], also held the central position on the document co-citation map. This level of influence is somewhat unusual in science mapping studies.

In addition to Yunus and Morduch, several other key authors were identified as highly influential through the multiple citation analyses conducted in this study. These include Khandker, Karlan, Mersland, Demircuc-Kunt, Hulme, Mosley, Cull, Lensink, Hartaska, and Hermes. Key documents identified in this literature were highlighted in Tables 6 and 7. Documents worthy of special mention include *Microfinance: Its impact, outreach, and sustainability* [94], *Finance against poverty* [100], or *Do regulated microfinance institutions achieve better sustainability and outreach?* [92]. Those reports represent prime examples of scholarship linking sustainability and microfinance as a special form of financing.

Several of the most highly-cited documents do not appear in the co-citation analysis ranking. Those deal with comparably specific but nonetheless prominent topics, such as conservation [17,18], building sustainable hybrid organizations [141], micro-finance investments to fight medical and partner violence issues [106,140], migrants and transformation [142], sustainability and African agriculture [143], or microfinance in the context of neoliberalism and "rational economic women" [112]. Consequently, this does not necessarily lead to co-citations in the overall research of microfinance.

The author and document co-citation maps revealed a stable coherent structure for the microfinance knowledge base. The three schools of thought underlying microfinance research were: (1) the institutional aspects of microfinance and performance of MFIs, (2) a group of microfinance scholars using sophisticated research methods to study the impact and sustainability of microfinance practices and initiatives, and (3) a concentration of early microfinance publications on poverty alleviation and social justice.

It should be emphasized that this review employed systematic empirical means of documenting the long-term intellectual contributions of these scholars and documents to discourse on microfinance. These scholars deserve recognition for shaping the field. However, there is also practical value to be derived from the results of these citation analyses. Specifically, both the data tables (i.e., Tables 1–7) and co-citation maps presented in this review can point scholars entering the field of microfinance towards key scholars and documents, thereby reducing the time needed to understand this literature.

This study conducted science mapping of the global knowledgebase on microfinance, and is the first-ever, comprehensive review of quality research (Scopus database) undertaken on this topic. Scholars that earlier examined this domain [39] followed a different approach by adopting narrower document selection criteria and also included other document sources.

It is hoped that the findings of this study will guide future research on sustainable finance and microfinance in institutions, politics, and society.

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