


Article

Women Entrepreneurship and Sustainable Development: Bibliometric Analysis and Emerging Research Trends

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Abstract: Women entrepreneurship has attracted the attention of academics and practitioners with a large body of research studies in recent years. Past literature reviews on women entrepreneurship have been criticized for their limited scope, lack of interdisciplinary perspective, and the need for more objective, technology-facilitated analytical methods. Our study provides insights into the development of women entrepreneurship research, including a new analysis through the lens of sustainable development and the impact of the COVID-19 pandemic. Bibliometric indicators and a systematic literature review approach are used to analyze literature published between 1991 and 2021 to better map the development of research and related opportunities for enhancing studies on women entrepreneurship. In addition to traditional bibliometric indicators such as publications, citations, etc., we used altmetrics, a new metric to assess the engagement and impact of publications based on social media presence. The Dimensions database has been used to assemble and arrange 3157 publications on women entrepreneurship, of which 843 publications are directly aligned with the Sustainable Development Goals (SDG) and 80 publications related to COVID-19. Our findings indicate that the top three SDG of interest to researchers are: SDG 8, decent work and economic growth; SDG 10, reducing inequalities; and SDG 5, gender equality. Within each SDG, we find concentrated studies on themes relating to the socio-political and small-medium enterprises, including family business management and gender biases, and their implications for sustainable development. Further, studies on the impact of COVID-19 reveal a significant bias towards women's empowerment in ICT, digitization, and e-commerce while exposing the need for gender-moderated policies and governmental interventions. We offer suggestions for future studies on enabling and measuring the contributions of women's entrepreneurship to sustainable development, including capital investments and the long-term impacts of the pandemic on women-led enterprises.

Keywords: entrepreneurship; citation analysis; gender; sustainable development; bibliometrics; altmetrics; COVID-19; SDG

1. Introduction

Women comprise half the world's population and play a vital role in economic and social development. The dramatic increase in women entrepreneurship in the last decade

signifies the critical role women potentially play in global sustainable development [1]. Further, women possess strong creative and opportunity-sensing capabilities that lean towards innovative, socially responsible business leadership, promoting societal well-being and sustainable development [2]. According to the Global Entrepreneurship Monitor's (GEM) report, entitled 2018/2019 Women's Entrepreneurship Report [3], there were an estimated 231 million women who had either started or were running new businesses in 2019. However, the report also reveals that women's entrepreneurial activity varies significantly across different economies and is intractably related to socio-cultural factors. A large body of academic literature [4,5] on women entrepreneurship has grown over the years, focusing on various themes such as drivers, barriers, risks, and business outcomes. Studies have also adopted various models such as a cross-cultural cognitive model of new venture creation [6]. Systematic reviews of the literature aiming to describe and assess how research is organized and conducted in the field of women (or female) entrepreneurship have been undertaken by several researchers, in which distinct variances in research concentration and strategy across the themes have been identified, though some themes have attracted more research attention than others [5–8].

However, past literature reviews on women entrepreneurship have been criticized for their limited scope, lack of interdisciplinary perspective, and need for more objective, technology-facilitated analytical methods [5,6]. For instance, it has been argued that past reviews of women entrepreneurship research tend to be narrow and highly context-specific, e.g., women and internationalization [7], rural women entrepreneurship [9], and women entrepreneurs in STEM fields [10]. An added shortcoming is that papers reviewed were predominantly from commerce and management discipline-focused journals [5], lacking a multi-disciplinary lens, e.g., sociological and political perspectives. Criticisms have also been raised of inherent methodological shortcomings related to the arbitrary selection of publications, which increases the risk of sample selection bias. The approach to content analysis does not seem to fully capture the inter-connectivity across different research themes within the field. Further, narrative reviews do not offer a comprehensive theory development or testing [11,12]. For example, Deng et al. (2020) contend, " . . . previous qualitative reviews are typically based on personal judgment, while a few quantitative reviews only describe statistical data" [6]. p. 61. The call for more systematic, objective, data-analytical technologies for conducting reviews on research literature is thus loud and clear.

Our study responds to this literature gap by undertaking a bibliometrics approach for reviewing the literature on women entrepreneurship to better map the strategic patterns and opportunities for further research based on a systematic and technology-facilitated approach. The bibliometric methodology seeks to identify research themes and trends within a given field of interest through the use of selected indicators such as citation indices that are enabled by data-analytical programs capable of handling large volumes of data and visualization techniques [13–15]. Two recent, notable bibliometrics-based literature reviews of women entrepreneurship studies were undertaken by Santos et al. (2018) and Deng et al. (2021) [5,6]. Santos et al. (2018) used the citation data of papers drawn from the Web of Science indexed database published over a four-decade period (1976–2017) in management, sociology, psychology, and other social sciences [5]. They identified three research clusters: (1) entrepreneurial profile, (2) gender identity and theoretical conceptualizations, and (3) the entrepreneurial process context, and highlighted opportunities for further research on gender inequalities. The review also identified factors that either enable or restrict the cooperation of businesses, public enterprises, NGOs, and community organizations in converting new scientific ideas into practical applications. In a similar vein, but using a much larger set of keywords for sample selection, Deng et al. (2020) analyzed data from the Web of Science covering four decades (i.e., from 1975 to 2018) to track women entrepreneurship research [6]. Their findings reveal that researchers have predominantly focused on " . . . individual determinants of female entrepreneurship, the impact of cultural and contextual factors on female entrepreneurship and female entrepreneurship in non-OECD countries, as well as the impact of family, social and institutional factors on the survival and exit

of male and female enterprises" p. 61. Further, they also call for more multidisciplinary research and greater cooperation among researchers, institutions, and countries. Compared to past studies, the bibliometric analysis by Deng et al. (2020) involved more rigorous mapping and visualization tools based on more objective, data-analytical technologies and a more comprehensive snapshot of publications on women's entrepreneurship based on an extensive and complete set of keywords [6].

Nevertheless, there are at least two shortcomings in analyzing and mapping the women's entrepreneurship research field. The first is a lack of analysis of women's entrepreneurship research and sustainable development, including the UN Sustainable Development Goals (SDG). Sustainable development relates to improving the wellbeing of society without compromising the needs of future generations, which necessitates balancing the approaches to achieving economic, environmental, and social outcomes. In 2015, the UN announced its 2030 Agenda on Sustainable Development and 17 Sustainable Development Goals (SDG), representing a blueprint for developing sustainable economies and communities. Further, the UN strongly emphasizes women entrepreneurs' potential role in nurturing sustainable solutions for numerous global challenges, e.g., poverty, hunger, education, reduced inequalities, and human rights. SDG 5, gender equality, includes goals and targets to explicitly promote women's rights to economic resources, property ownership, and financial resources, and enforceable legislation for gender equality [16]. We must have a better understanding of research development in the area of women entrepreneurship and sustainable development given the notable growth of women entrepreneurship in developing nations, as findings from such research can better feed into the 2030 Agenda [17–19].

Furthermore, there is evidence that women entrepreneurs' awareness of sustainable development issues is rising. Women link their business activities to sustainable development outcomes such as alleviating economic hardship within communities, promoting gender equality, and using environmentally friendly practices [20–22]. Yet, the research concentrations and trends in this area are unclear. Though Santos et al. (2018) and Deng et al. (2020) reveal a dramatic escalation in women entrepreneurship studies from 2014 onwards, their analysis does not seek to trace research patterns relating to sustainable development and women entrepreneurship [5,6]. Such insights would be beneficial for assessing research advancement in this area and identifying gaps and opportunities for the advancement of women entrepreneurs' contribution to sustainable development.

The second shortcoming addressed by this study is the opacity of research developments on the link between women's entrepreneurship and the COVID-19 pandemic. The advent of the COVID-19 pandemic in 2020 was explosive for the global economy, with unprecedented effects on businesses. The GEM 2022 global report on the status and perceptions of entrepreneurship activities found that, compared to 2019, the proportion of study respondents who saw good opportunities in starting a new business fell dramatically in 2021. A higher proportion of respondents reported knowing of business closures rather than business start-ups. Past studies investigating COVID-19 impacts on entrepreneurship report heightened invisibility of women entrepreneurs due to higher structural inequalities in developed nations such as the USA, UK, and Canada [23]. They also report women-led micro-enterprises to be the segment most impacted by the pandemic because of reduced access to financial and managerial resources [24] and note that studies on recovery from the Covid impact are more male-dominated and more focused on STEM, ignoring women-led enterprises [25]. The pandemic has more strongly and negatively impacted the economic status of women than men [26].

On the contrary, Manolova et al. (2020) report the successful use of business model pivots by women entrepreneurs in adapting to the pandemic and leveraging opportunities, such as digitizing business models [27]. For instance, studies by Manolova et al. (2020) and Popovic'-Pantic ' et al. (2020) report that women entrepreneurs significantly improved their revenues by pivoting from an offline wholesale model to an online model [27,28]. Such findings tend to challenge the traditional narratives from past literature, in which women entrepreneurs are assumed to be non-adopters of information technology [29]. There is a

clear call for studies on the impact of COVID-19 on women entrepreneurship and a need to find more effective and efficient strategies for entrepreneurial resilience to such crises over the long run [28]. Thus, a more in-depth systematic analysis of research efforts invested in understanding research connectivity between women entrepreneurs and the COVID-19 pandemic is timely and warranted.

2. Our Study

Our study undertakes a comprehensive bibliometric and altmetrics analysis of research on women entrepreneurship covering the years from 1991 to 2021. The main objective of the study is to describe how women entrepreneurship research is organized in terms of publications, citations, authors, journals, institutions, and social media presence (altmetrics). In this study, a scientific mapping of women entrepreneurship using bibliographic couplings and keyword co-occurrence analysis techniques has also been conducted. The study also identifies the main research themes linking women entrepreneurship and the Sustainable Development Goals (SDG) and women entrepreneurship and the COVID-19 pandemic.

Though past studies such as Santos et al. (2018) and Deng et al. (2020) captured data until 2018 [5,6], this study includes data until 2021, including the COVID-19 years. Regarding criterion items for identifying thematic clusters, past studies have mainly used publication counts and citation scores or indicators such as the Journal Impact Factor or h-index. In addition to these scores, we utilize the Altmetrics Attention Score, which “... is a weighted count of all of the mentions Altmetrics has tracked for individual research output and is designed to indicate the amount and reach of the attention an item has received” [30,31]. Thus, this study utilizes an alternate assessment of the importance of research outputs related to women’s entrepreneurship perceived from more general societal interests.

We anticipate the systematic analysis undertaken in this paper to contribute to extending the data on women entrepreneurship research by launching an exclusive interrogation of the impacts of two critical global developments, i.e., the SDG and the COVID-19 pandemic. Having a clear idea of research trends and gaps in these two topics can help direct research and policymaking for women entrepreneurs that meets critical emergent issues of global concern. The remainder of this paper is organized as follows. The following section provides a background to women’s entrepreneurship research development. The following sections delineate the research methods and protocols followed for the literature review, findings, and results. The final two sections present conclusions and suggestions for future research directions and limitations of the study.

3. Women Entrepreneurship—Background

According to Ahl (2006), the first paper on women entrepreneurship was published by Schwartz (1976) [32,33]. The study involved interviews with 20 women entrepreneurs, focusing on their characteristics, attitudes, and motivations. Thereafter, the progression of research was relatively slow until around 2015. Deng et al. (2020) report that the period from 1975 to 2006 was rather slow, but from 2006 to 2014, there was steady growth with fewer than 50 publications per year [6]. However, from 2014 onwards, the increase in studies has been exponential, with more than 150 publications per year on average. Over the past four decades, many developments in the socio-cultural and socio-political arenas have shaped women’s entrepreneurship. Advancements in technology, greater societal awareness, empathy for gender equality, and increasing regulatory and institutional policies for women in business have shaped the motivations, nature, and extent of women’s entrepreneurial activities and outcomes.

Sustainable entrepreneurship is an emergent concept within entrepreneurship research [34]. Bringing together the notions of sustainability and entrepreneurship, sustainable entrepreneurship relates to the integration of social and environmental goals into the core of business goals and activities [35]. Sustainable entrepreneurs generate new organizational modes and forms that substantially reduce negative impacts on the environment and society while addressing economic objectives and ethical imperatives [35,36]. The outcomes

of sustainable entrepreneurship have direct consequences for the UN 2030 Agenda and the 17 SDG. Of these 17 goals, SDG 5, gender equality, has direct relevance for women entrepreneurs, focusing on equal rights for women to economic resources. Samantroy (2018) suggests strengthening women's entrepreneurial activities, keeping in view declining female labor force participation and commitment towards the achievement of SDG 5 [37]. Based on a review of the sustainable energy sector literature, Mahajan and Bandhopadhyay (2020) located eight women-led enterprises in the sector operating in Asia, Africa, and the USA [17]. Using a case study methodology, they studied the influence of the women-led enterprises on SDG, and the findings indicated impacts on not one but multiple SDG, namely "SDG 1 (poverty), SDG 2 (zero hunger), SDG 3 (good health and well-being), SDG 4 (quality education), SDG 5 (gender equality), SDG 6 (clean water and sanitation), SDG 8 (decent work and economic growth), SDG 10 (reduced inequalities), and SDG 13 (climate action)". However, the associations made were not systematically assessed but inferred from the interviews.

Empirical evidence relating to the broader concept of sustainable development suggests that although there are systematic variances in the use of sustainable entrepreneurship by women entrepreneurs, they are also intensely conscious of the need to support sustainable communities and develop more sustainable products and processes. For instance, [22] studied 40 women entrepreneurs from four developing countries (India, Sri Lanka, Maldives, and Nigeria). They found the business models of these women to center on "trading with the poor, helping the community to develop skills and abilities, paying fair prices and receiving fair payments, encouraging fair treatment of all staff and encouraging environment-friendly conditions in business operations" (p. 176). Fernandez et al. (2021) reviewed 28 papers from the Web of Science (Core Collection) published from 1980–2021 [1]. The publications were extracted based on search strings on female OR women AND sustainable entrepreneurship. Most of the publications focus on gender differences, impact (on economy, social, and environment), and tourism (articles reported involvement in female entrepreneurship, especially in the tourism sector). The findings suggest that firms led by women tend to be more oriented towards sustainability than firms headed by male counterparts and that businesses created by women have a higher propensity to be developed based on their "knowledge, experience, added value, quality of services offered, and their impact on the environment." [1].

4. Research Methods

We adopt the method of bibliometric review, which is a type of Systematic Literature Review (SLR), in this study [38]. A comprehensive dataset of available research is required for SLR [39]. SLR is distinguished from other review techniques due to its principles [40]. The Dimensions research data platform, launched by Digital Science, was used to retrieve bibliographic data on women's entrepreneurship [41,42]. This platform provides a wide array of research data, including grants, publications, citations, clinical trials, and patents. The data set for this study spanned from 1991 to 2021. The bibliometric methodology has grown in popularity for reviewing literature [13,43] and involves identifying research outputs based on keywords. Visualisation of Similarities (VoS) viewer software [44] has been used in this study to analyze bibliographic mappings and keyword co-occurrences [45,46]. Nandiyanto and Al Husaeni (2021) have utilized VoS viewer software to build keyword maps based on networks or relationships between existing items [47]. Our study has also used the alluvial diagram, a flow diagram traditionally used to illustrate the temporal changes in network composition. Alluvial diagrams are tools that reveal stories in the network data and allow us to connect structural and functional changes [48]. Besides traditional bibliometrics measures, altmetrics was used for analysis in this study. Altmetrics is a broad class of metrics that attempts to capture research impact through social media [30,49,50]. Altmetrics is tracked for individual research output and is designed to indicate the amount and reach of a publication's attention [51]. The Altmetrics Attention Score (AAS) has been used to find the overall attention to a publication, a weighted count of

all the online attention. As far as we know, altmetrics has not been adopted by past studies on women entrepreneurship or, in general, for bibliometrics studies. Adopting a review protocol is a best practice for systematic literature reviews, as it promotes transparency and replication of review findings [52]. As described in the following section, we have adopted the Scientific Procedures and Rationales for Systematic Literature Reviews (SPAR-4-SLR) protocol [38].

SPAR-4-SLR Protocol

We have used the SPAR-4-SLR review protocol rather than another review protocol such as the PRISMA protocol, which emerged from the pure science discipline, because of its rigor. The different stages of SPAR-4-SLR are assembling, arranging, and assessing (Figure 1). We assembled and arranged 3157 publications based on keywords from the Dimensions database, with 843 publications related to the SDG and 80 publications having COVID-19 in the abstract and title of the publication.

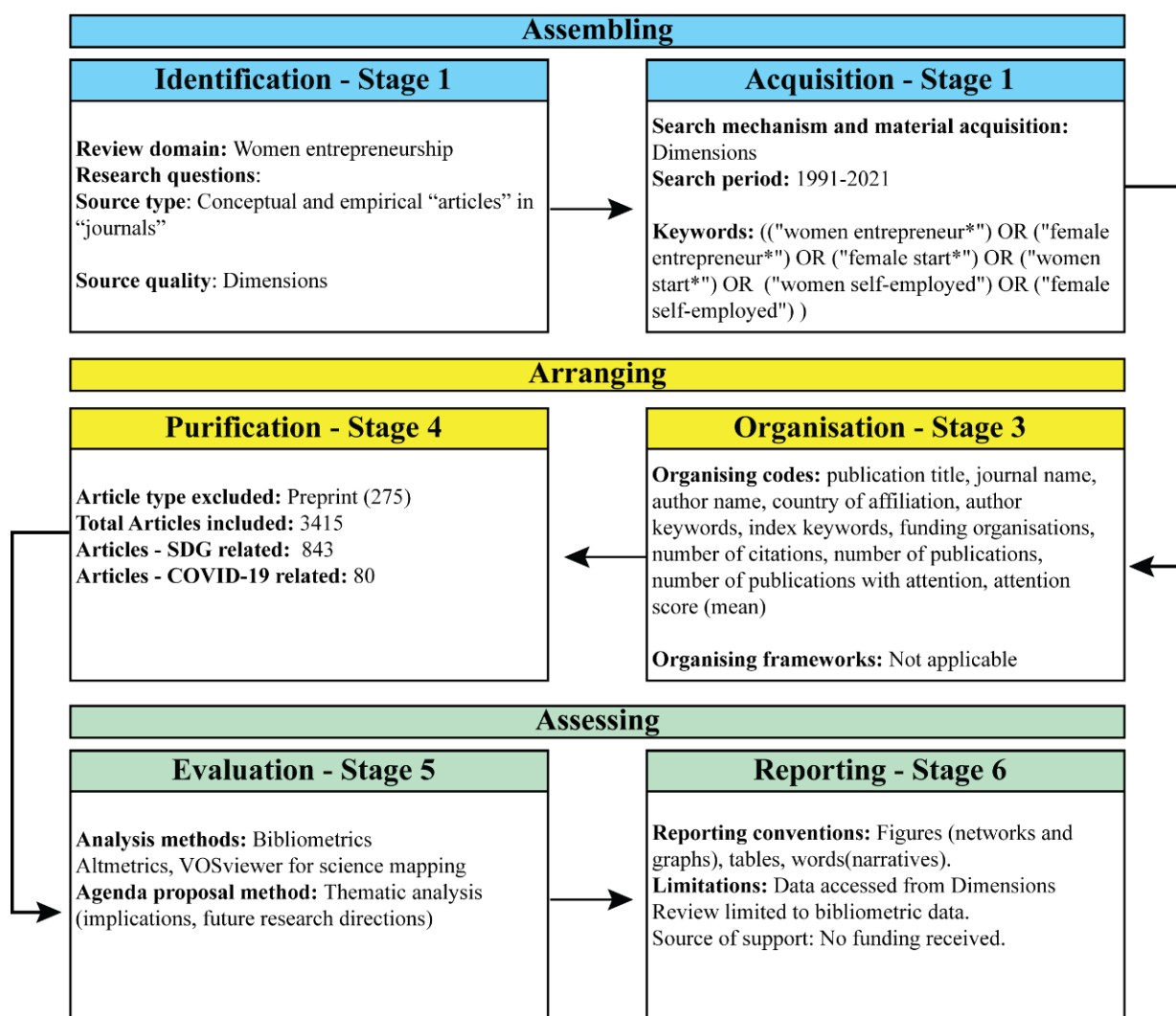


Figure 1. SPAR-4-SLR review protocol stages.

5. Results

5.1. Trends of Publications, Citations, and Altmetrics

Women entrepreneurship literature grew slowly over its initial two decades (Figure 2), i.e., from 1991 to 2010, with a more noticeable growth between 2014 and 2018, suggesting that this research field aroused great research interest of scholars through 2018 [6]. More

remarkably, this trend escalated both in terms of TP and TC from 2019 to 2021, almost doubling the number of studies (TP: 313, TC: 5438) in 2020 (TP: 446, TC: 7193) and 2021 (TP: 477, TC: 9706).

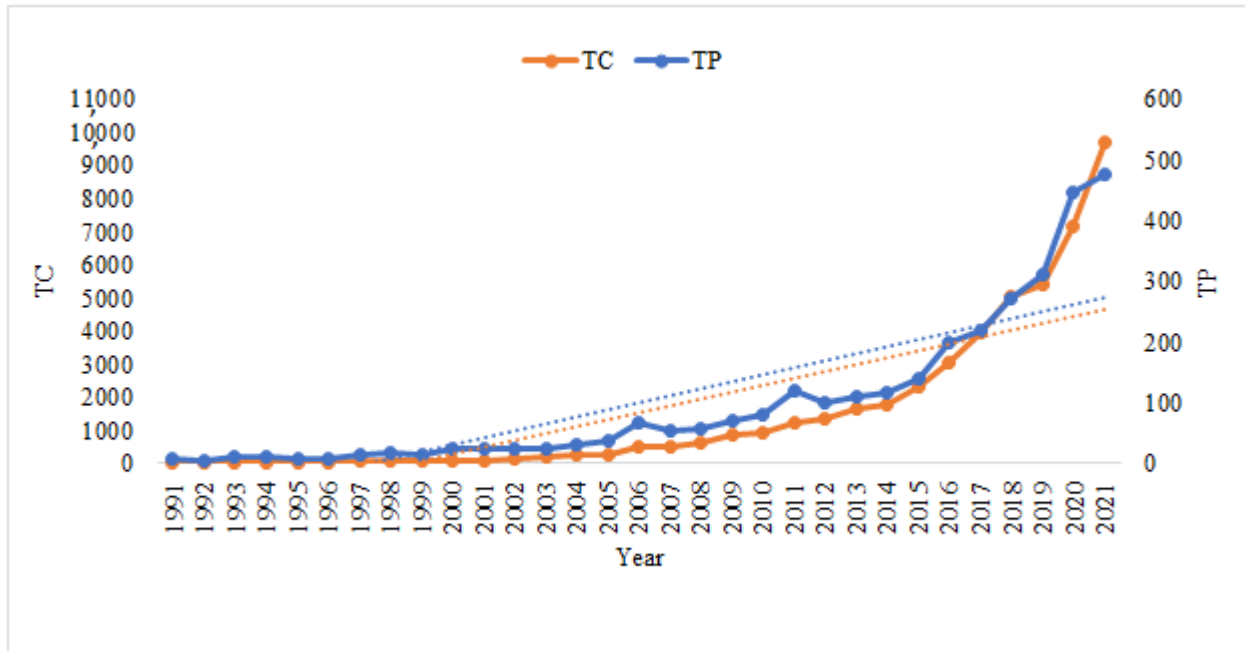


Figure 2. The graph represents the publication and citation trends. Note: TP = Total publications; TC: Total citations.

For the altmetrics, we have considered the recent decade of 2011–2021. Overall, there has been an increasing trend in the Altmetrics Attention Score, with the highest AAS of 18.3 in 2017 (Figure 3). This may be attributed to the increased usage of social media worldwide for academic purposes [53] and possibly to the adoption of the UN SDG in late 2015.

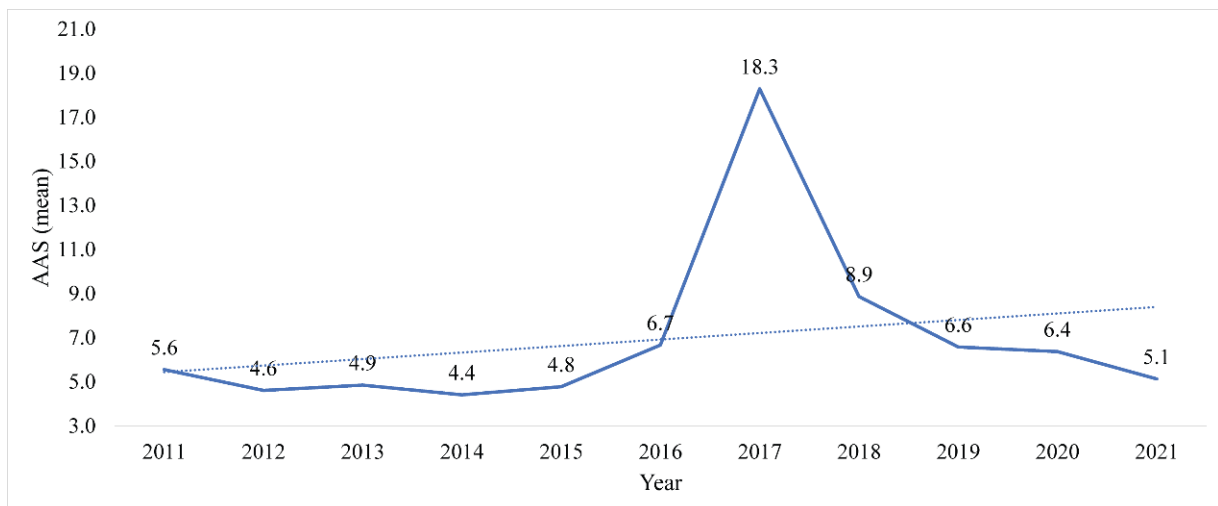


Figure 3. Trends of publications with Altmetrics Attention Score (AAS). Note: AAS (mean) = Altmetrics attention score (mean).

Over the last decade, the total publications with attention (TPA) have been inconsistent, with two distinct dips in 2016 and 2020, respectively (Figure 4). The percentage of Total Publications with Attention (TPA) was the highest in 2013 (TPA: 37.7), followed by 2012

(TPA: 35.3). Then, we can see a significant drop during the pandemic years, with an increase during the year 2021.

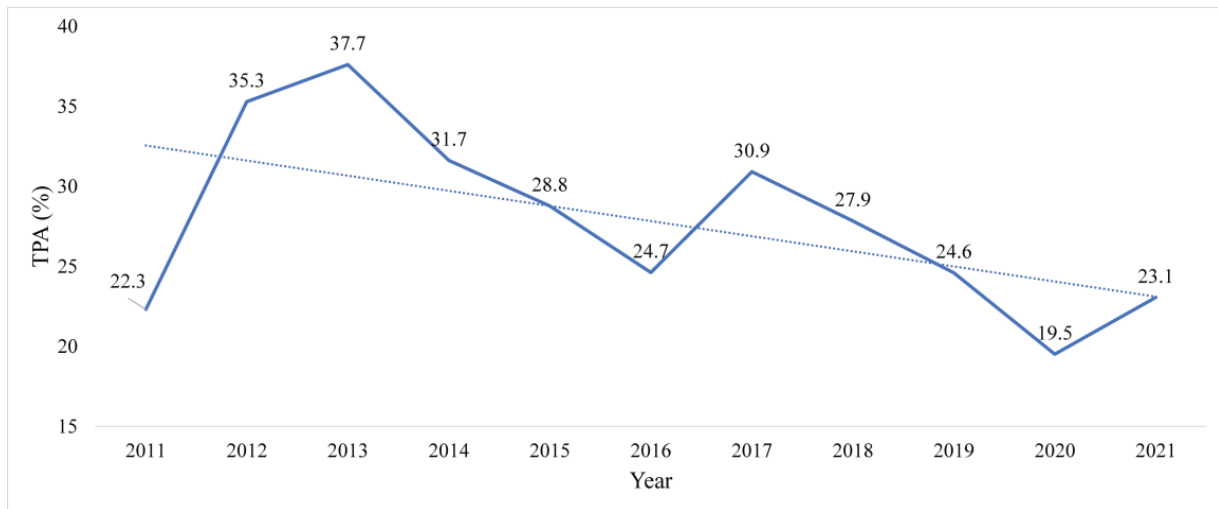


Figure 4. Trends in the percentage of Total Publications with Attention (TPA). Note: TPA (%) = Total publications with attention.

5.2. Open Access (OA)

Open Access (OA) to scientific literature means the removal of barriers, including price barriers, from accessing scholarly work [54]. OA articles receive more citations than closed access articles [55]. A consistent rise in the number of open access publications is observed (Figure 5) from 2005, which correlates with a significant increase in the volume of open access publications [56].

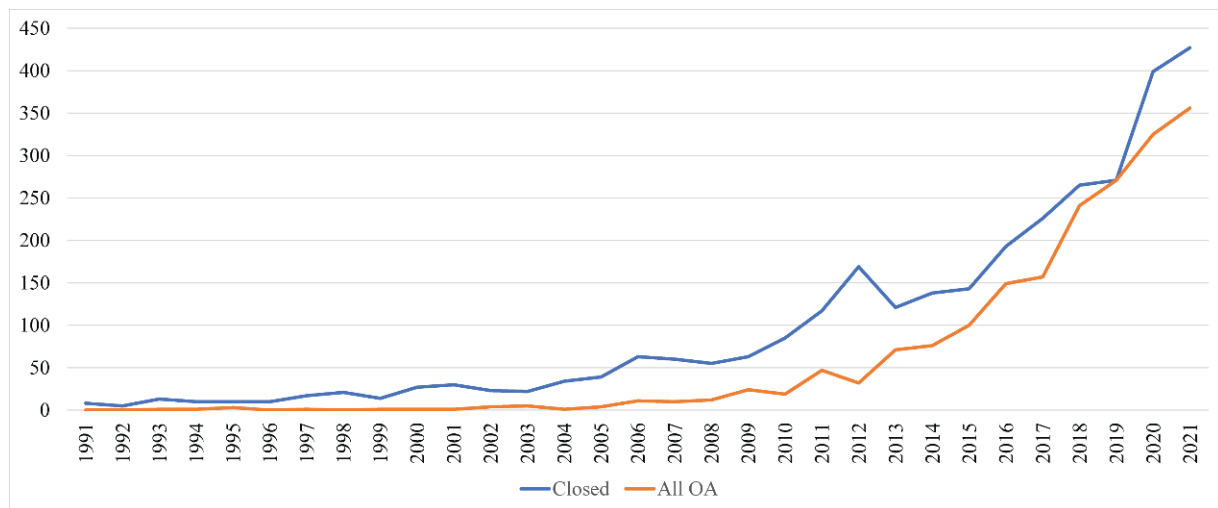


Figure 5. Open Access publications on women entrepreneurship. Note: OA = Open access.

In this study, 697 OA publications contributed 10,635 citations (Table 1). Interestingly, citations per publication (TC/TP) were similar between open and closed access types. This may be due to the late adoption of OA journals for women entrepreneurship.

Table 1. Open Access publications and their citations.

| Publication Type | TP | TC | TC/TP |
|------------------|------|--------|-------|
| Closed | 2460 | 38,147 | 15.5 |
| Open | 697 | 10,635 | 15.2 |

Note: TP = Total publications; TC = Total citations; TC/TP = Total citations per publication.

5.3. Top Contributing Authors

The top contributing authors based on TP are Brush (TP: 41) from the United States and Welter (TP: 41, TC: 2163) from Germany. (Table 2). The mean AAS of Brush is the highest (30.2), which indicates greater social media attention. Marlow has the highest publication with an attention percentage (TPA%: 60), followed by Brush (TPA%: 43.9). This list shares a few similarities with recent studies [6,57], with differences in ranking.

Table 2. Top 10 authors based on publications and citations.

| (a) Top 10 Authors Based on Publications | | | | | |
|--|-----------------|------|------|---------|------|
| Name | Country | TP | TC | TPA (%) | AAS |
| Candida Greer Brush | United States | 41 | 2823 | 43.9 | 30.2 |
| Friederike Welter | Germany | 41 | 2163 | 36.6 | 12.7 |
| Colette Henry | Ireland | 28 | 323 | 32.1 | 14.1 |
| Dianne H B Welsh | United States | 23 | 460 | 30.4 | 1.6 |
| Veland Ramadani | North Macedonia | 22 | 539 | 13.6 | 2.3 |
| Eugene Kaciak | Poland | 22 | 376 | 31.8 | 1.7 |
| Saadat Saeed | United Kingdom | 16 | 96 | 18.8 | 3.7 |
| Alain Fayolle | Italy | 16 | 74 | 18.8 | 3.3 |
| Susan Marlow | United Kingdom | 15 | 1304 | 60.0 | 14.3 |
| Shumaila Y Yousafzai | United Kingdom | 15 | 96 | 20.0 | 3.7 |
| (b) Top 10 Authors Based on Citations | | | | | |
| Name | Country | TC | TP | TPA (%) | AAS |
| Candida Greer Brush | United States | 2823 | 41 | 43.9 | 30.2 |
| Friederike Welter | Germany | 2163 | 41 | 36.6 | 12.7 |
| Susan Marlow | United Kingdom | 1304 | 15 | 60.0 | 14.3 |
| Helene Ahl | Sweden | 1189 | 11 | 27.3 | 16.7 |
| Anne M De Bruin | New Zealand | 1066 | 7 | 28.6 | 13.5 |
| Nancy M Carter | United States | 825 | 9 | 33.3 | 3.0 |
| Robert D Hisrich | United States | 748 | 10 | 20.0 | 4.0 |
| Ingrid Verheul | Netherlands | 690 | 3 | 66.7 | 9.0 |
| Patricia Gene Greene | United States | 674 | 13 | 46.2 | 76.5 |
| Maria Minniti | United States | 644 | 3 | 66.7 | 7.0 |

Note: TP = Total publications; TC = Total citations; TC/TP = Total citations per publication; TPA = Total publications with attention; AAS = Altmetric attention score.

Table 2 also highlights the authors based on TC. The most frequently cited author is Brush (TC: 2823), who incidentally has the highest TP (41) as well, followed by Welter (TC: 2163). The most frequently cited publication of Brush's is "Research on women entrepreneurs: Challenges to (and from) the broader entrepreneurship literature?", which was published in 2013 (TC: 1077).

5.4. Highest-Contributing Institutions

According to Total Publications (TP), the highest-contributing institutions to women entrepreneurship according to publications (TP) are shown in Table 3. The United States has two institutions in the top 10, followed by other countries. Among the top-contributing institutions, Babson College contributes the most (TP: 34, TC: 2729), followed by the University of North Carolina at Greensboro (UNCG) (TP: 25, TC: 611), both from the United States. Interestingly, though Jönköping University, Sweden, has only 17 publications, they

have a higher number of citations (TC: 1888) than the UNCG (TC: 611), which has the second-highest number of publications (TP: 25). The University of Sussex has the highest TPA% (64.2), and Babson College has the highest mean Altmetrics Attention Score (AAS mean: 31.6), followed by Jönköping University (AAS mean: 8.7). The higher citation and mean AAS indicate the research papers’ impact to be high both academically and socially.

Table 3. Top 10 contributing institutions based on publications.

| Name | Country | TP | TC | TC/TP | TPA | AAS |
|---|----------------|----|------|-------|------|------|
| Babson College | United States | 34 | 2729 | 80.3 | 61.8 | 31.6 |
| University of North Carolina at Greensboro (UNCG) | United States | 25 | 611 | 24.4 | 28.0 | 1.6 |
| Brock University | Canada | 22 | 296 | 13.5 | 31.8 | 1.9 |
| Kozminski University | Poland | 22 | 361 | 16.4 | 31.8 | 1.7 |
| University of Tehran (UT) | Iran | 22 | 111 | 5.1 | 4.6 | 3.0 |
| Jönköping University | Sweden | 17 | 1888 | 111.1 | 41.2 | 8.7 |
| Sapienza University of Rome | Italy | 16 | 414 | 25.9 | 37.5 | 4.0 |
| University of Sussex | United Kingdom | 14 | 231 | 16.5 | 64.3 | 4.3 |
| University of Valencia (UV) | Spain | 14 | 176 | 12.6 | 21.4 | 2.7 |
| University of Ghana | Ghana | 14 | 193 | 13.8 | 28.6 | 1.8 |

Note: TP = Total publications; TC = Total citations; TC/TP = Total citations per publication; TPA = Total publications with attention; AAS = Altmetric attention score.

Figure 6 represents the alluvial diagram visualization for the top-contributing institutions. The filters used were the names of the institutions, country, and publication number. The size of each node represents TP. The diagram shows the flow of the top 20 institutions to their respective countries. The UK has the most contributing institutions with n = 4, followed by the US (n = 3) and Sweden (n = 3), but the US has more publications (TP: 72) than the UK (TP: 47).

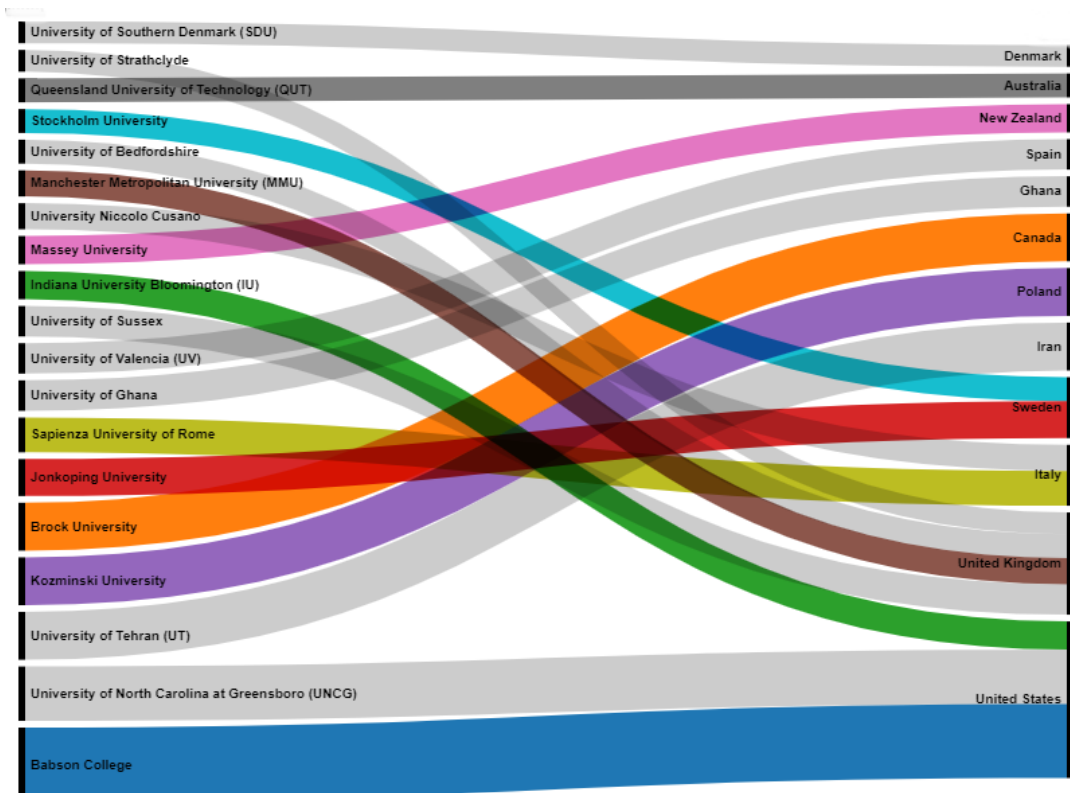


Figure 6. Alluvial diagram showing the top 20 institutions contributing to the women entrepreneurship research.

5.5. Most Influential Journals

Identifying the most influential journals is essential, because these findings will be helpful for future researchers to target these journals for publication. Table 4 shows the top influential journals. The results show that the top journals are the *International Journal of Gender and Entrepreneurship*, *Gender in Management*, an *International Journal*, and the *International Journal of Entrepreneurship and Small Business*. The *International Journal of Gender and Entrepreneurship* has the maximum number of publications (TP: 136), followed by *Gender in Management* and the *International Journal* (TP: 78). Even though *Small Business Economics* has only 54 publications, they have 3049 citations.

Table 4. Top influential journals.

| Name | TP | TC | TC/TP | TPA | AAS |
|--|-----|------|-------|------|------|
| International Journal of Gender and Entrepreneurship | 136 | 2714 | 20.0 | 44.1 | 2.8 |
| Gender in Management an International Journal | 78 | 2129 | 27.3 | 29.5 | 2.9 |
| International Journal of Entrepreneurship and Small Business | 73 | 487 | 6.7 | 2.7 | 2.0 |
| Academy of Management Proceedings | 67 | 50 | 0.8 | 6.0 | 6.5 |
| Small Business Economics | 54 | 3049 | 56.5 | 64.8 | 8.9 |
| Contributions to Management Science | 53 | 86 | 1.6 | 5.7 | 6.0 |
| International Journal of Entrepreneurial Behaviour and Research | 47 | 1360 | 28.9 | 29.8 | 4.1 |
| SEDME (Small Enterprises Development Management and Extension Journal) | 47 | 2 | 0.0 | - | - |
| Journal of Small Business and Entrepreneurship | 45 | 496 | 11.0 | 13.3 | 2.0 |
| Journal of Developmental Entrepreneurship | 44 | 750 | 17.1 | 11.4 | 12.2 |

Note: TP = Total publications; TC = Total citations; TC/TP = Total citations per publication; TPA = Total publications with attention; AAS = Altmetrics Attention Score.

The TPA percentage of the *International Journal of Gender and Entrepreneurship*, which has the highest number of publications, is 44.1, and *Small Business Economics* has the highest TPA of 64.8 with TP:54. The mean AAS also varies widely between 2 to 12.2, with the *Journal of Developmental Entrepreneurship* having the highest score. The findings differ from past studies [6]. This could be because of the large volume of publications and citations during the last two years.

5.6. Fields of Research

We identified Fields of Research (FoR) in the literature on women entrepreneurship through bibliometric citation data and analysis. Cole and Eales [58] were among the first to use published literature to build up a quantitative picture of progress in a field of research. FoR is defined and divided into three levels: divisions, groups, and fields. The divisions are broader subject or research areas in a discipline. Further, groups and fields show the detailed subset of these categories. Table 5 shows the field of research and the number of publications and citations published under each field. The results show that the top three publications are in the fields of Commerce, Management, Tourism and Services (TP: 1795, TC: 38,846), Business and Management (TP: 1713, TC: 37,521), and Studies in Human Society (TP: 759, TC: 8234).

5.7. Major Funding Organisations

As women entrepreneurs play a crucial role in the current society, their funding is essential. It is vital to identify the top funding organizations of women entrepreneurship. We recognize the top funding organizations of women entrepreneurship through citation and publication data. Table 6 shows the list of the top funding organizations, affiliated countries, publications, and citations based on their funded projects. The principal funding organizations for women's entrepreneurship are the European Commission (EC), the National Natural Science Foundation of China (NSFC), the Economic and Social Research

Council (ESRC), the Ministry of Economy, Industry, and Competitiveness (MINECO), and the Swedish Research Council (SRC). These findings are helpful for the researchers and education bodies to apply for funds and projects.

Table 5. Top 10 Fields of Research based on publications and citations.

| Name | TP | TC |
|---|------|--------|
| Commerce, Management, Tourism, and Services | 1795 | 38,846 |
| Business and Management | 1713 | 37,521 |
| Studies in Human Society | 759 | 8234 |
| Other Studies in Human Society | 472 | 5163 |
| Economics | 311 | 4507 |
| Applied Economics | 267 | 3422 |
| Sociology | 259 | 2839 |
| Marketing | 135 | 6741 |
| Language, Communication, and Culture | 130 | 922 |
| Policy and Administration | 125 | 860 |

Note: TP = Total publications; TC = Total citations.

Table 6. Major funding organizations and their country.

| Name | Country | TP | TC | TC/TP |
|--|----------------|----|-----|-------|
| European Commission (EC) | Belgium | 18 | 217 | 12.1 |
| National Natural Science Foundation of China (NSFC) | China | 16 | 93 | 5.8 |
| Economic and Social Research Council (ESRC) | United Kingdom | 12 | 202 | 16.8 |
| Ministry of Economy, Industry, and Competitiveness (MINECO) | Spain | 10 | 414 | 41.4 |
| Swedish Research Council (SRC) | Sweden | 8 | 106 | 13.2 |
| Ewing Marion Kauffman Foundation | United States | 7 | 106 | 15.1 |
| British Academy (BA) | United Kingdom | 7 | 197 | 28.1 |
| Ministry of Education of the People's Republic of China (MOE) | China | 6 | 17 | 2.8 |
| National Science Center (NCN) | Poland | 5 | 14 | 2.8 |
| Swedish Research Council for Environment Agricultural Sciences | Sweden | 5 | 83 | 16.6 |

Note: TP = Total publications; TC = Total citations; TC/TP = Total citations per publication.

Among the major funders, the European Commission has the most significant number of publications (TP: 18), followed by the National Natural Science Foundation of China (TP: 16) and the Economic and Social Research Council (TP: 12). Among the top-citing significant funders, the Ministry of Economy, Industry, and Competitiveness (Spain) leads for citing the highest number of women entrepreneurship articles between 1991 and 2021 (TC: 414), followed by the European Commission (EC) (Belgium) (TC: 217). MINECO has the highest average TC/TP of 41.4, followed by the British Academy (TC/TP: 28.1).

Figure 7 represents the alluvial diagram visualization for the significant funding organizations dataset. The filters used were the name of the funding organization, country, and the TP. The size of each node represents the number of publications. The diagram focuses on the flow of the funding organizations to the respective countries. The UK and China have the most funding organizations in the top 10 undertaking research in women entrepreneurship (n = 2). Belgium (n = 1) tops the major funding organizations with the highest number of publications (TP: 18).

5.8. Bibliographic Coupling Based on Countries

Bibliographic coupling and co-citation analysis are the most widely used citation-based techniques [59]. They are more appropriate for studying emergent literature fields and capturing current research trends within an area than other methods [60,61]. Kessler (1963)

introduced bibliographic coupling as one of the most common citation-based coupling measures of similarity between scientific items. Bibliographic coupling can be used to explore the similarities in different research actors such as journals, institutes, and countries. It refers to the number of shared references between two articles [45].

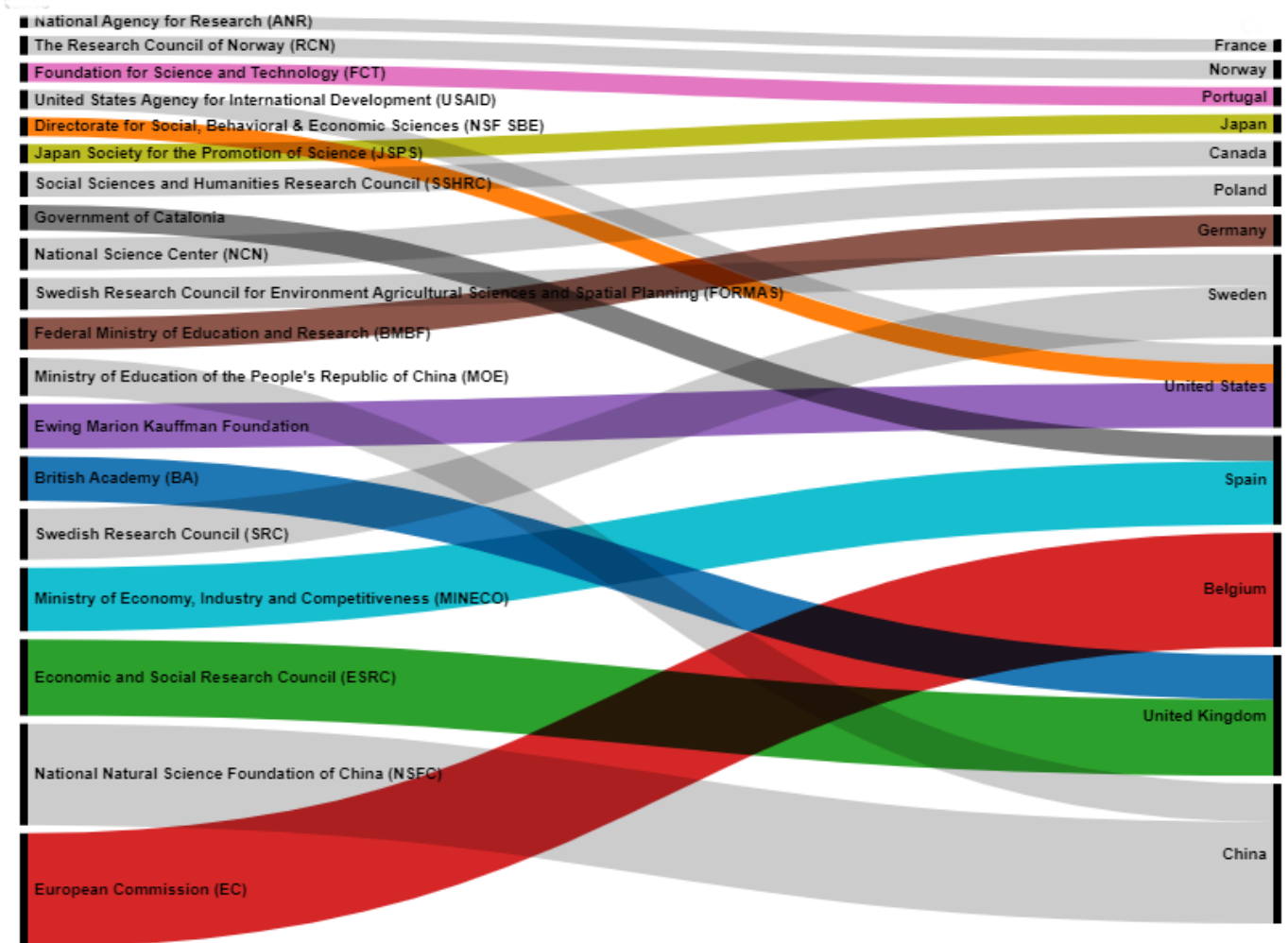


Figure 7. Alluvial diagram: flow of the funding organizations to respective countries.

Bibliographic coupling has been used to understand trends in publications and citations in three time periods: T1 (1991–2000), T2 (2001–2010), and T3 (2011–2021). There is only one cluster (red) in T1, with five countries with TP: 52, TC: 126, and TC/TP:2.42 (Figure 8). The United States has the most publications and citations (TP: 17, TC: 854) in this cluster. In T1, the foci of the most highly cited (TC) publications are gender, work, family variables, the prospects of men's and women's businesses, and the performance analysis of male and female entrepreneurs.

In T2, we can see 1 cluster (red) in T1, but the number of countries has increased from 5 to 11 (Figure 9), with TP: 331, TC: 1719, and TC/TP: 5.19. In T2, the most publications and citations are from the United States (TP: 50, TC: 1520), followed by the United Kingdom (TP: 29, TC: 520). Research contributions from countries such as Australia (TP: 11), India (TP: 11), and Germany (TP:10) started featuring bibliographic coupling from T2. The research themes in T2 mainly focused on gender framework and stereotypes, research frameworks for women entrepreneurship, and the growth and venture size of women entrepreneurs.

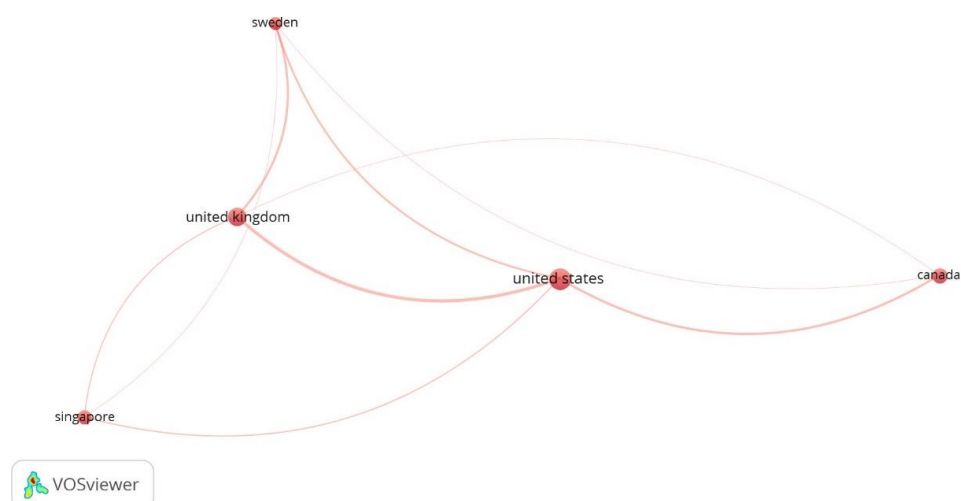


Figure 8. Bibliographic couplings based on countries during T1.

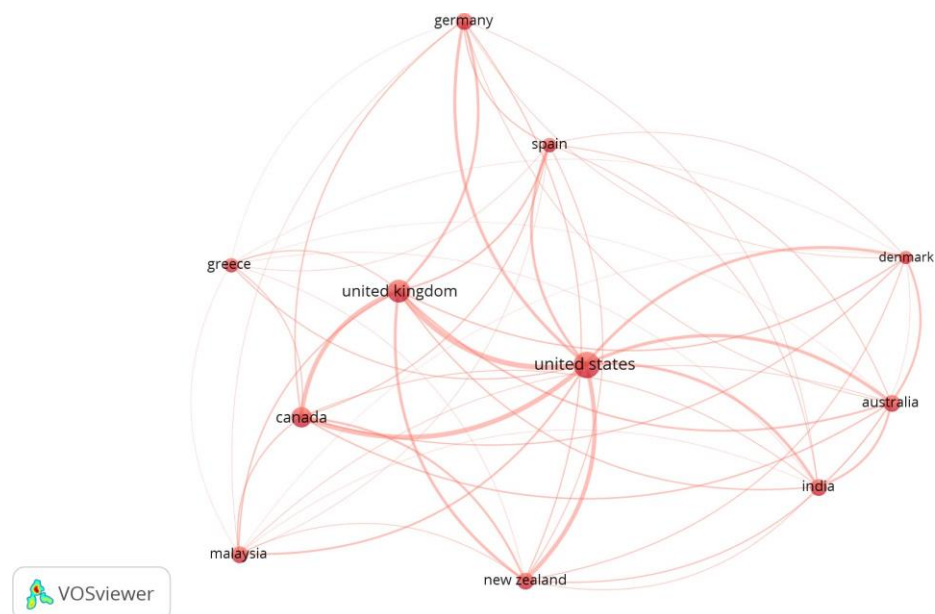


Figure 9. Bibliographic couplings based on countries during T2.

We can see an exponential increase in the research output on women's entrepreneurship in T3, and Figure 10 demonstrates the same. Three clusters (red, green, and blue) can be seen: cluster 1 (red) with 24 countries (TP: 962, TC: 6597), cluster 2 (green) with 16 countries (TP: 912, TC: 10,079), and cluster 3 (blue) with 15 countries (TP: 715, TC: 8482). The country with the most scientific interest in the women entrepreneurship theme in cluster 1 is India (TP: 235, TC: 908); in cluster 2, it is the United States (TP: 467, TC: 6851), and in cluster 3, it is the United Kingdom (TP: 279, TC: 4834). Though the publications (TP) from India are the highest in number, the citations (TC) are more from publications from the United States, which may be because of the early contributions from the researchers. The foci of the researchers in T3 are new directions and dimensions of research in women entrepreneurship, women empowerment, challenging myths in women entrepreneurship and institutions, and women entrepreneurship, which highlights the acceptance of women in entrepreneurship, breaking gender stereotypes, and the role that gender stereotypes play in society.

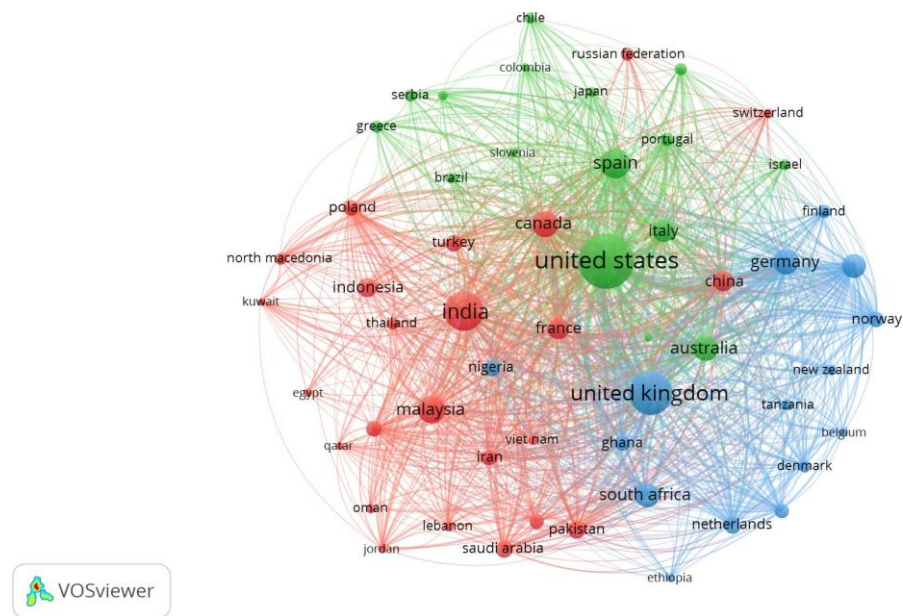


Figure 10. Bibliographic couplings based on countries during T3.

5.9. Keyword Co-Occurrence Analysis

The co-occurrence network analysis [62,63] investigated female entrepreneurship themes’ hot topics and research frontiers. VOSviewer was used for the co-occurrence analysis of keywords in three time periods, i.e., T1 (1991–2000), T2 (2001–2010), and T3 (2011–2021), to provide easy-to-interpret clusters of hot topics in women entrepreneurship literature [44]. A coherent narrative has been created by arranging each cluster’s keywords [52]. Keyword co-occurrence analysis shows cluster 1 (red: 12) and cluster 2 (green: 7) during T1 (Figure 11). A threshold of 5 was kept, and it returned a total of 26 keywords. The main keywords in cluster 1 are Africa, employment, human rights, research, socioeconomics, women’s rights, income generation, women’s status, organization, and management, which can be grouped under the theme “women’s rights and socioeconomic status.” Cluster 2 includes women entrepreneurship, microenterprise, developing country, and gender, grouped under “micro-enterprise and gender.”

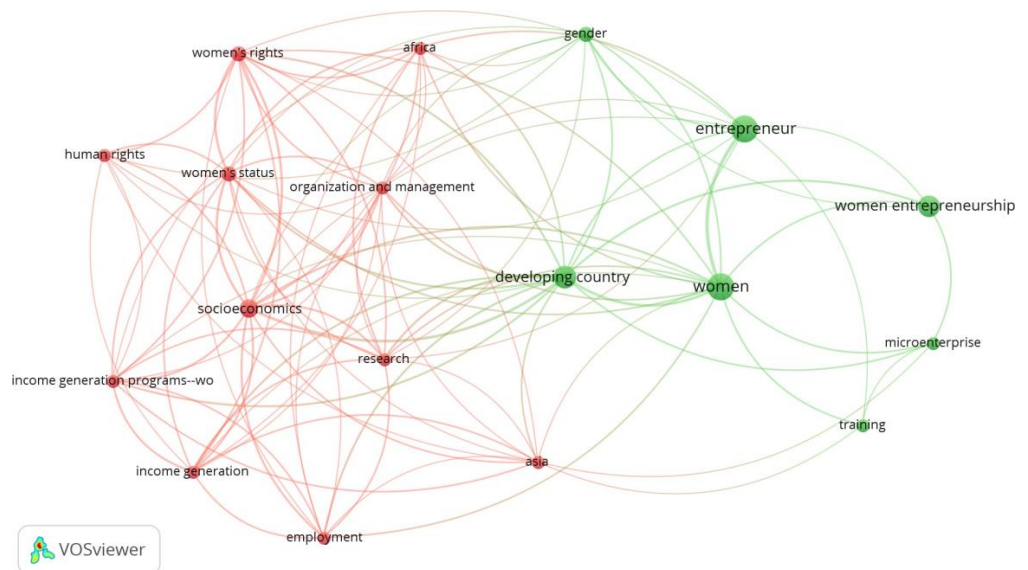


Figure 11. Keyword co-occurrence analysis during T1.

In T2 (Figure 12), we can see two clusters, with keywords in both cluster 1 (red: 10) and cluster 2 (green: 8). A threshold of 5 was kept, and it returned a total of 24 keywords. The main keywords in cluster 1 are Africa, employment, female, human rights, research, socioeconomics, women's rights, income generation, women's status, organization, and management, grouped under the theme "women's rights and entrepreneurship". Cluster 2 includes Asia, developing country, women, entrepreneur, training, microenterprise, and women entrepreneurship, within the theme "microenterprise and women entrepreneurship." In T2, the research was focused on women entrepreneurship models and gender equality.

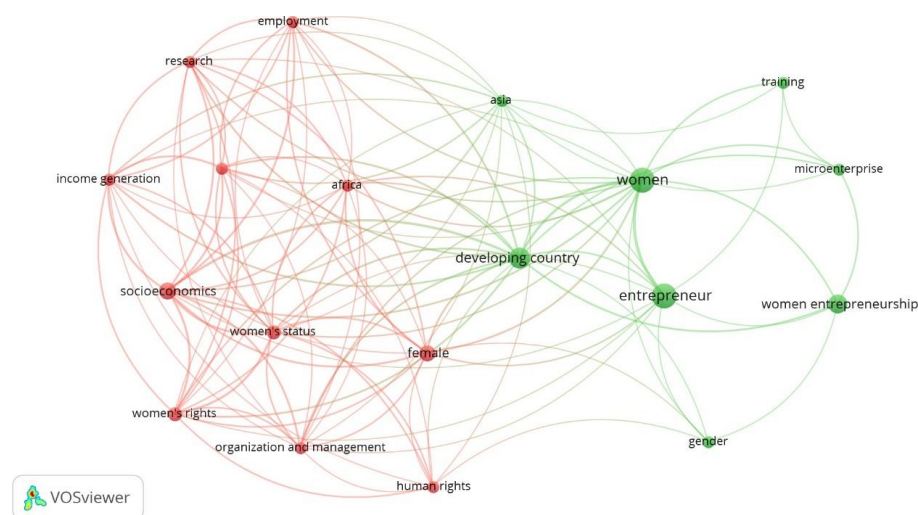


Figure 12. Keyword co-occurrence analysis during T2.

In T3, three clusters (red, green, and blue) are visible (Figure 13). We can see 44 keywords in cluster 1 (red), 32 keywords in cluster 2 (green), and 17 keywords in cluster 3 (blue). A threshold of 5 was kept, and it returned a total of 93 keywords. Cluster 1 has major keywords such as barriers, business, performance, challenges, commerce, decision-making, and sustainable development, grouped under the theme of "barriers and enablers to women entrepreneurship." Cluster 2 has keywords such as business, business development, China, COVID-19, economic growth, and developing world, which focuses on "gender and woman entrepreneurship." Cluster 3 has keywords such as economic development, employment, self-efficacy, and social entrepreneurship, highlighting "economic development and women entrepreneurship."

A review of keyword co-occurrence across the three time periods (i.e., over the three decades) indicates economic development, employment, and gender roles and rights to be constant issues of interest for research. However, in T3, there were many more keywords, publications, and a more complex web on interlinked ideas and themes. Sustainable development as a keyword was linked to information management, SMEs, technology, women entrepreneur, and entrepreneurship education, flagging education issues and building awareness on entrepreneurship being critical.

5.10. Bibliographic Coupling of Publications

An analysis of the bibliographic coupling network based on publications is shown in Figure 14, which allows for the establishment of clusters of publications that are semantically and thematically closest to each other [44]. The relatedness of the publications is determined based on the number of references they share. The size of the circles is proportional to the number of citations. The lines connect publications co-citing another publication. The total link strength reflects the number of references co-cited by the two publications.

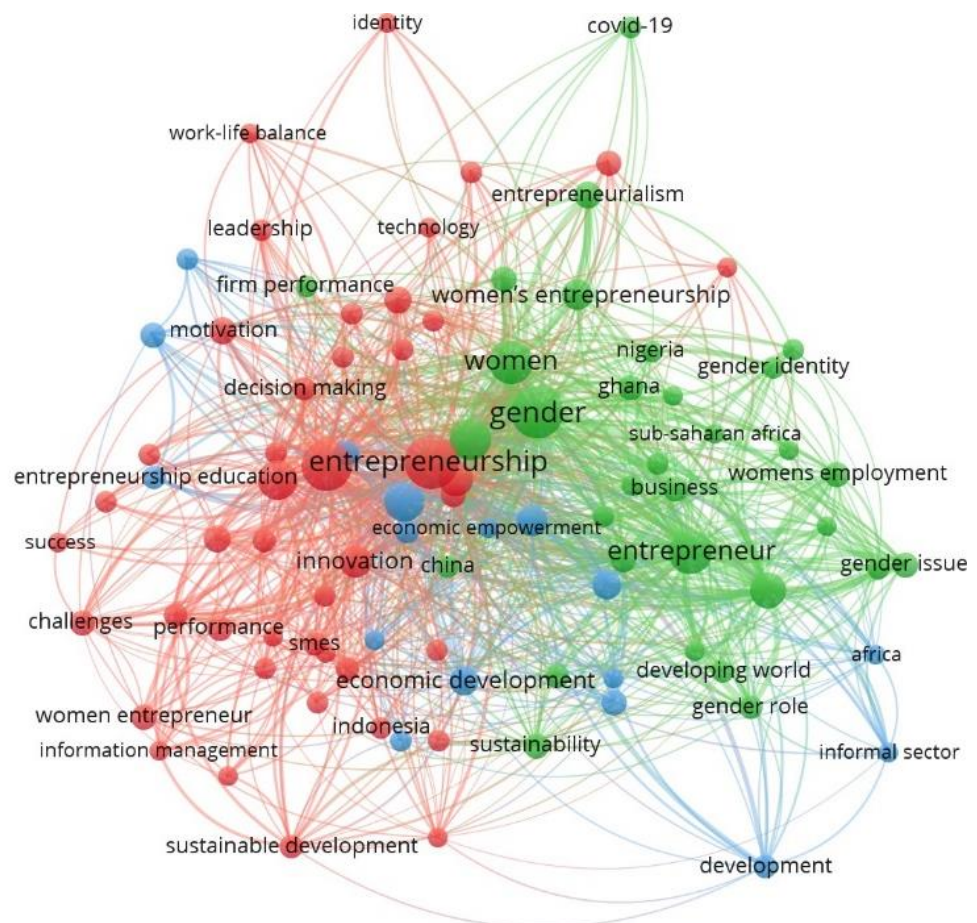


Figure 13. Keyword co-occurrence analysis during T3.

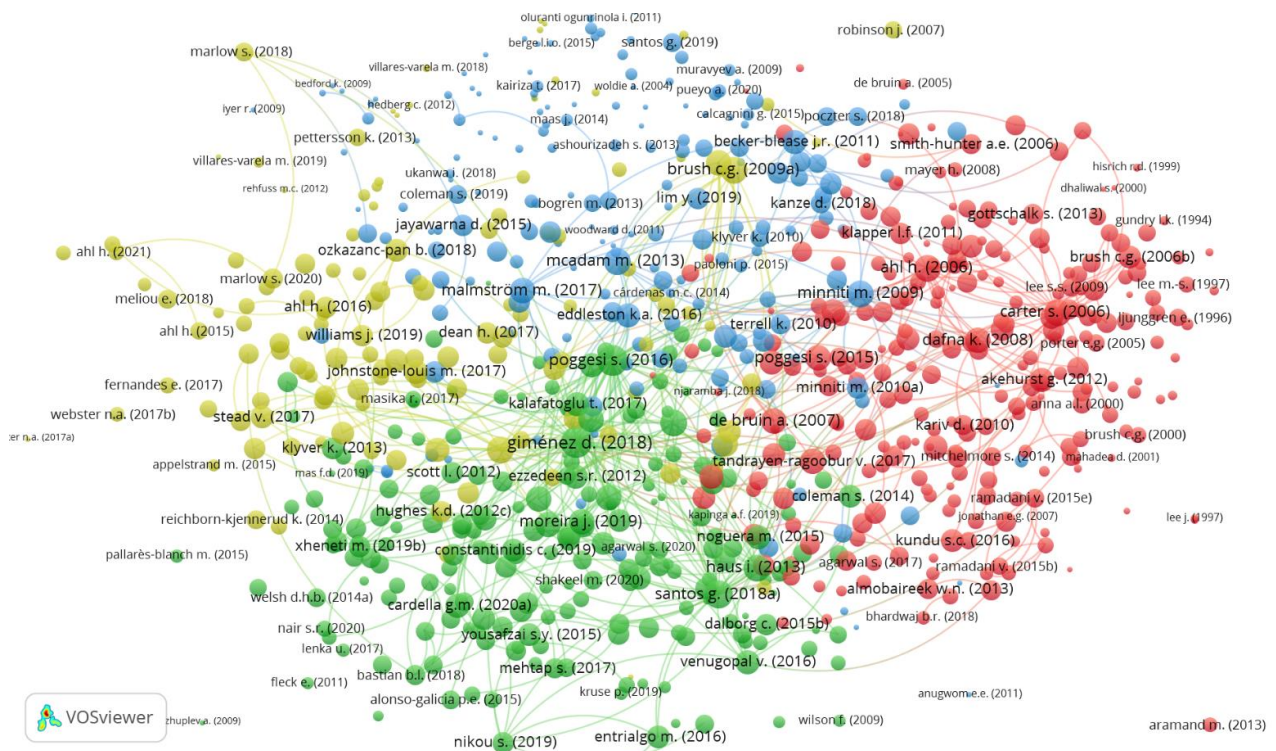


Figure 14. Bibliographic coupling network based on publications.

To identify the strongest relations, a threshold of 10 citations per publication was kept, which returned 809 out of the total of 3157 publications, resulting in four clusters. Cluster 1, shown in red, has 263 publications, cluster 2 in green has 210 publications, cluster 3 in blue has 193 publications, and cluster 4 in yellow has 143 publications.

Table 7 shows the top ten documents based on total link strength. The publications with the highest link strength were by Giménez D. (2018), Poggesi S. (2016), Santos G. (2018a), Carter S. (2006), and Mcadam M. (2013), and most of the documents are from cluster 2.

Table 7. Top ten publications based on total link strength.

| Publications | Cluster | Total Link Strength | Total Citations |
|-------------------------|---------|---------------------|-----------------|
| Giménez D. (2018) | 2 | 3444 | 18 |
| Poggesi S. (2016) | 2 | 3333 | 80 |
| Santos G. (2018a) | 2 | 2646 | 24 |
| Carter S. (2006) | 1 | 2472 | 20 |
| Mcadam M. (2013) | 3 | 2415 | 43 |
| Haus I. (2013) | 2 | 2411 | 117 |
| Hechavarria D.M. (2016) | 4 | 2381 | 32 |
| Justo R. (2015) | 2 | 2352 | 83 |
| Minniti M. (2009) | 3 | 2328 | 104 |
| Ahl H. (2006) | 1 | 2257 | 941 |

The four clusters in Figure 14 are further analyzed for thematic areas. The top three publications in each cluster based on the total link strength are shown in Table 8. The main theme of cluster 1, highlighted in red, is “women entrepreneurship research”, cluster 2 (green) is “gender effects and entrepreneurship”, cluster 3 (blue) is “gender issues in entrepreneurship”, and cluster 4 (yellow) is “gendered perspective of entrepreneurship”.

Table 8. Cluster analysis based on the bibliographic coupling of publications.

| Cluster | Colour | Publications | Total Link Strength | TC | Name of Publication | Main Theme |
|---------|--------|---------------------|---------------------|-----|--|---|
| 1 | Red | Carter S. (2006) | 2472 | 20 | Women’s business ownership: Recent research and policy developments | Barriers and enablers to women entrepreneurship |
| | | Ahl H. (2006) | 2257 | 941 | Why research on women entrepreneurs needs new directions | |
| | | De Bruin A. (2007) | 2018 | 412 | Advancing a framework for coherent research on women’s entrepreneurship | |
| 2 | Green | Giménez D. (2018) | 3444 | 18 | The salient role of institutions in women’s entrepreneurship: A critical review and agenda for future research | Economic development and women entrepreneurship |
| | | Poggesi S. (2016) | 3333 | 80 | What’s new in female entrepreneurship research? Answers from the literature | |
| | | Santos G. (2018a) | 2646 | 24 | A look back over the past 40 years of female entrepreneurship: Mapping knowledge networks | |
| 3 | Blue | Mcadam M. (2013) | 2415 | 43 | Female entrepreneurship | Gender issues in entrepreneurship |
| | | Minniti M. (2009) | 2328 | 104 | Gender issues in entrepreneurship | |
| | | Malmström M. (2017) | 1958 | 81 | Gender stereotypes and venture support decisions: How governmental venture capitalists socially construct entrepreneurs’ potential | |

Table 8. Cont.

| Cluster | Colour | Publications | Total Link Strength | TC | Name of Publication | Main Theme |
|---------|--------|-------------------------|---------------------|-----|---|--|
| 4 | Yellow | Hechavarria D.M. (2016) | 2381 | 32 | The entrepreneurial gender divide: Hegemonic masculinity, emphasized femininity and organizational forms | Gendered perspective of entrepreneurship |
| | | Brush C.G. (2009a) | 2230 | 52 | A gender-aware framework for women's entrepreneurship | |
| | | Stead V. (2017) | 2180 | 459 | Belonging and women entrepreneurs: Women's navigation of gendered assumptions in entrepreneurial practice | |

Note: TC = Total citations.

5.11. Women Entrepreneurship and SDG

Dimensions automatically assigns an SDG category to publications [64]. We found 843 publications based on women entrepreneurship and SDG from the total sample of 3157 publications and selected SDG 10, SDG 8, and SDG 5, which accounted for 90% of publications. We also looked at the Sustainable Development Report [65] to understand where each country stands on achieving the 17 SDG. We used the overlay feature of the VOS viewer to show SDG publication trends over time.

In SDG 10 (Table 9), there are three clusters with 21 countries, and the United States, which is ranked 32 in the SDG rank index, is the highest contributor to the women entrepreneurship theme (TP: 21, TC: 617). Spain, ranked 20th in the SDG rankings, is second with TP: 9 and TC: 28, followed by Canada (SDG rank: 21), with TP: 4 and TC: 20. SDG 8 has three clusters with 41 countries, whereas SDG 5 has four sets with 52 countries. The United Kingdom (SDG rank: 17) features as the highest contributor in SDG 8 (TP: 14, TC: 406), and Indonesia (SDG rank: 97) is the highest contributor in SDG 5 (TP: 15, TC: 318). Although Sweden ranks second in the SDG rank index and is featured third as per the table, the full publications (TP) are only eight, with total citations (TC) of 166.

The network overlay visualization shows the countries contributing to the research area of women entrepreneurship literature by the year of publication. According to overlay visualization, yellow frames represent recently published countries. The network overlay (Figure 15) shows that the work on women entrepreneurship and SDG 10 (reduced inequalities) was already prevalent from the UK, Israel, and Canada in 2014. Researchers from countries such as Bangladesh, Nigeria, Peru, and Saudi Arabia have recently contributed to women's entrepreneurship.

Table 9. Major funding organizations and their country.

| SDG | Clusters | Countries | Top 3 Countries | SDG Rank |
|--------|----------|-----------|-----------------|----------|
| SDG 10 | 3 | 21 | United States | 32 |
| | | | Spain | 20 |
| | | | Canada | 21 |
| SDG 8 | 3 | 41 | United Kingdom | 17 |
| | | | Spain | 20 |
| | | | Sweden | 2 |
| SDG 5 | 4 | 52 | Indonesia | 97 |
| | | | Malaysia | 65 |
| | | | Australia | 35 |
| | | | | |

Note: SDG = Sustainable Development Goals.

For the SDG 10 (reduced inequalities) cluster and the country's contribution to the women's entrepreneurship theme, as depicted in Figure 15, the three top countries contributing to publication are the United States (TP: 21) in cluster 1, the United Kingdom (TP: 17) in cluster 2, and India (TP: 15) in cluster 3.

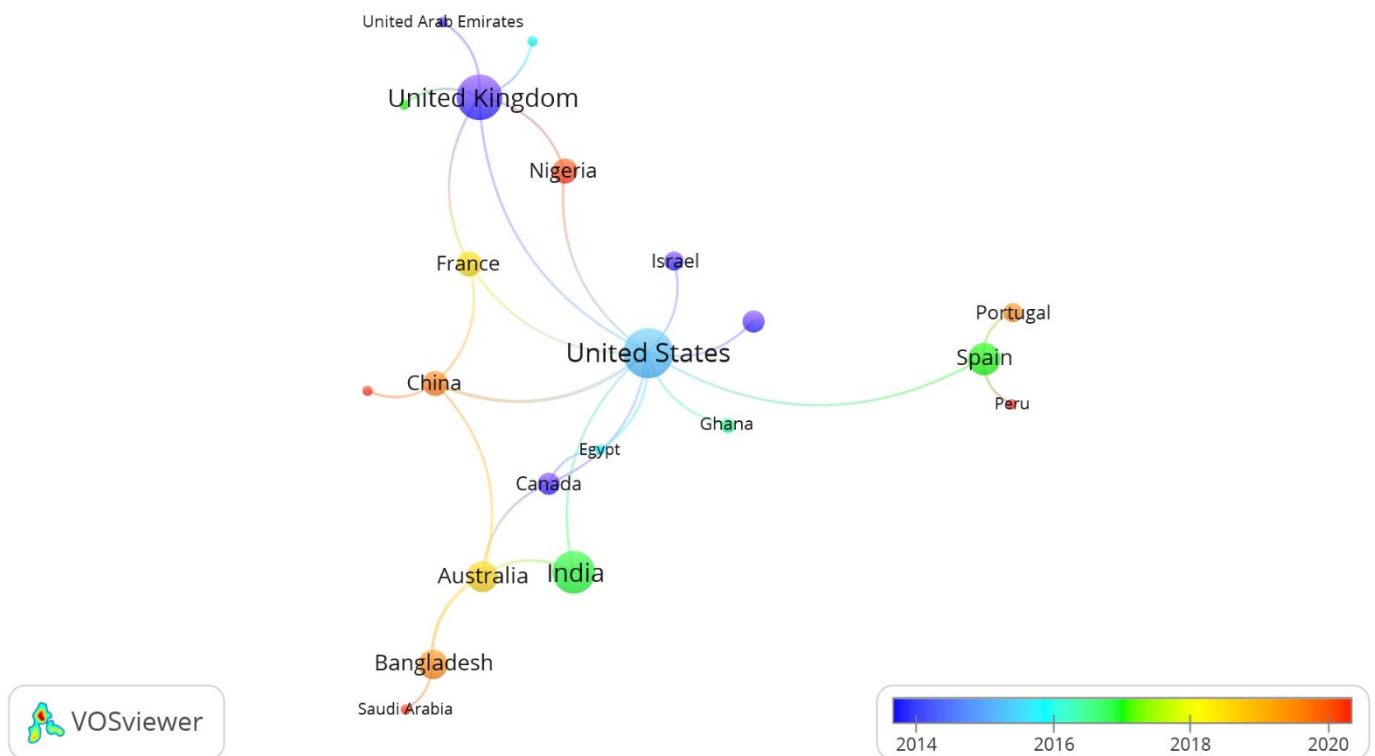


Figure 15. Country-level cluster analysis of women entrepreneurship and SDG 10.

In cluster 1, the other noteworthy contributions are from Spain, Canada, and Turkey; in cluster 2, from China, France, and Nigeria, and in cluster 3, from Australia and Bangladesh. We can also see that from 2020 onwards, research contributions coming from Peru (cluster 3) and Saudi Arabia (cluster 3) on SDG 10 increased, and more contributions from smaller countries such as Bangladesh (TP: 7), Portugal (TP: 3), and Nigeria (TP: 5) point to the fact that women entrepreneurship has contributed to reducing inequalities. In cluster 1, the top-cited publication (TC: 250) is “Israeli women entrepreneurs: An examination of factors affecting performance from the US”, published in 1997. This study, the first systematic investigation of performance variation among Israeli women entrepreneurs, examines individual factors influencing the performance of 200 Israeli women-owned businesses.

In cluster 2, the most frequently cited publication (TC: 96) is “Enterprise and Inequality: A Study of Avon in South Africa,” published in 2012 by authors in the UK. This study reports that in South Africa, Avon helps some impoverished women earn a better income and inspires empowerment among them. The authors introduced a new theory, pragmatist feminism, in this publication. In cluster 3, “China’s E-Commerce: Empowering Rural Women?”, published in 2019, is the most frequently cited publication (TC: 32). This publication employs a feminist political economy perspective to explore the connection between e-commerce, entrepreneurship, and gender in rural China.

The network overlay (Figure 16) of women entrepreneurship citing SDG 8 (decent work and economic growth) shows that India, Spain, Canada, Oman, and Egypt have recently contributed the most to this theme. We can see that there are three main clusters, with cluster 1 having countries such as the United Kingdom (TP: 14), Spain (TP: 10), Sweden (TP: 8), and India (TP: 6) contributing the most. In cluster 2, it is Brazil (TP: 3) that is contributing the most, and in cluster 3, it is the United States (TP: 22), China (TP: 7), and South Korea (TP: 6) contributing to SDG 8 and the women entrepreneurship theme. This shows a strong network between smaller countries such as Paraguay, Chile, Honduras, Panama, Bolivia, Mexico, and Argentina, highlighting SDG 8, which focuses on women entrepreneurship and decent work and economic growth. The United States and the United Kingdom contribute the most to the women entrepreneurship theme

and to SDG 8, highlighting how women entrepreneurship contributes heavily to decent work and economic growth in developed countries. “The ambitious entrepreneur high growth strategies of women-owned enterprises” is the most frequently cited publication (TC: 295) in cluster 1, highlighting that high-growth-oriented entrepreneurs differed from low-growth-oriented entrepreneurs. The article was published in 2001 by US authors. In cluster 2, the most frequently cited publication (TC: 53) is “Business training plus for female entrepreneurship? Short and medium-term experimental evidence”, published by authors from Peru. This study evaluates the impacts of a BDS program serving female microentrepreneurs in Lima using an experimental design. In cluster 3, “The dilemma of growth: Understanding venture size choices of women entrepreneurs” is the most frequently cited article (TC:289). The study, published by authors from the US in 2006, highlighted that growth is a deliberate choice and that women have a clear sense of the costs and benefits of growth and make careful trade-off decisions.

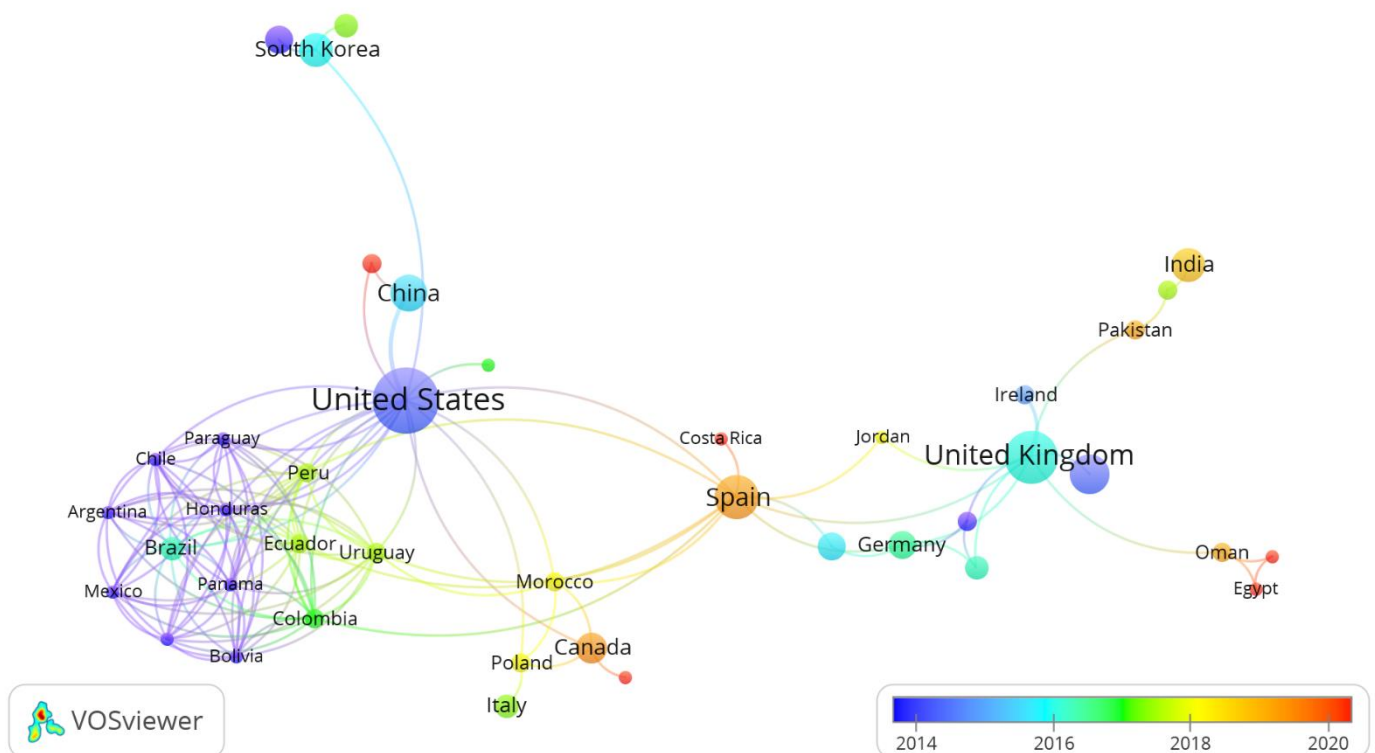


Figure 16. Country-level cluster analysis of women entrepreneurship and SDG 9.

The network outlay capturing studies on SDG 5 (Gender Equality), as shown in Figure 17, indicates research emanating from Thailand, Morocco, France, Chile, Botswana, Colombia, and Uruguay. Further analysis of SDG 5 in terms of the country’s contribution to women entrepreneurship show four major clusters, with Indonesia (TP: 15) and Malaysia (TP: 12) contributing the most in cluster 1, the United Kingdom (TP: 48) and South Africa (TP: 11) in cluster 2, Spain (TP: 22) and Canada (TP: 13) in cluster 3, and the United States (TP: 44) and India (TP: 36) in cluster 4. For SDG 8—cluster 1, “Entrepreneurs’ gender and financial constraints: Evidence from international data”, published in 2009 by authors from the UK, is the most frequently cited publication (TC: 227). This publication examines whether financial institutions discriminate against entrepreneurs based on gender. In cluster 2, the most frequently cited publication (TC: 50) is “Authoring the female entrepreneur while talking the discourse of work–family life”, published in 2015 by authors from Italy. This publication illustrates the gendering of entrepreneurship as an intertwined process of gendering and entrepreneurs that can commence from the analysis of a single situated practice. “In the name of women? Feminist readings of policies for women’s entrepreneurship in Scandinavia” is the most frequently cited publication (TC: 39) in cluster 3. The publication, written by

authors from Sweden and published in 2017, discusses claims that outcomes depend on the premises behind the policies. In cluster 4, the publication “The normative context for women’s participation in entrepreneurship: A multicountry study”, published in 2006 by US authors, is the most frequently cited (TC: 284). This study examines the impact of specific norms supporting women’s entrepreneurship on the relative rates of women to men engaged in entrepreneurship in different countries.

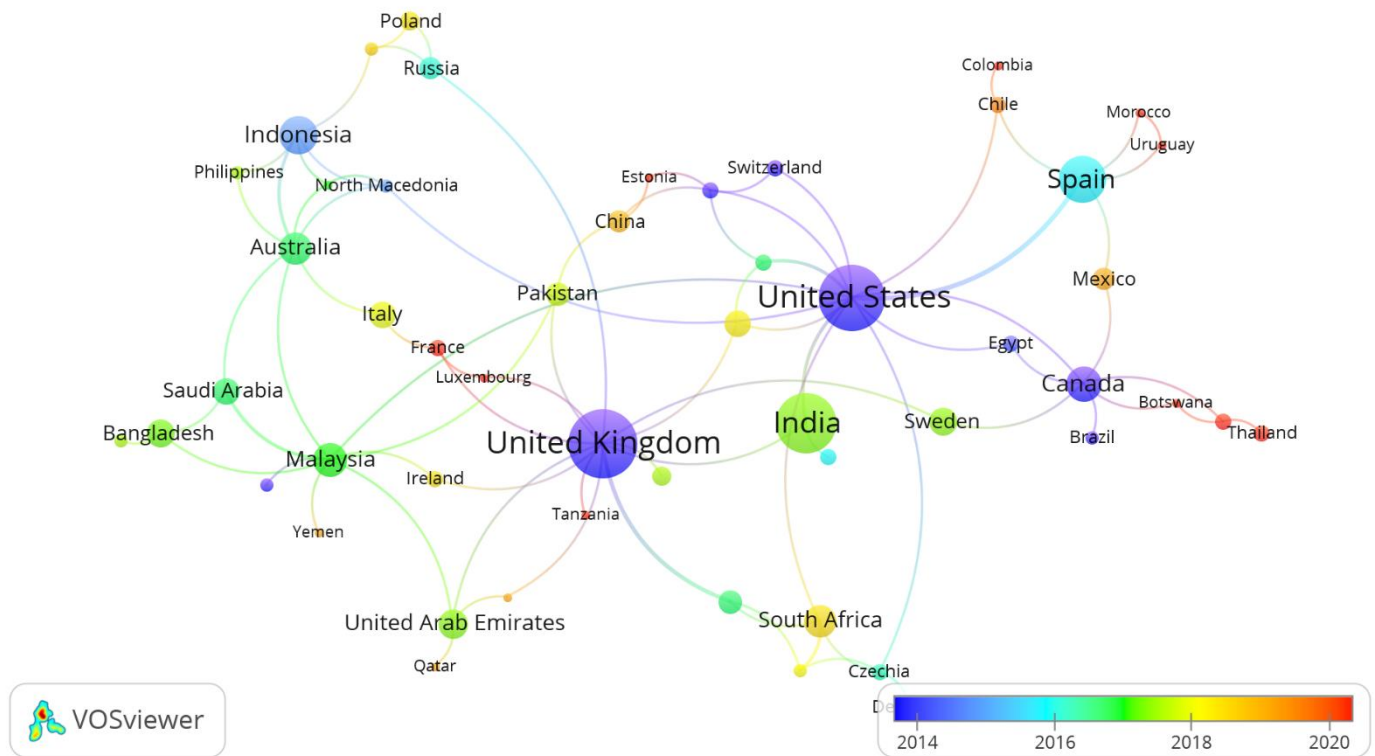


Figure 17. Country-level cluster analysis of women entrepreneurship and SDG 5.

Finally, we performed a co-occurrence keyword analysis on SDG and women entrepreneurship that has 843 publications. Four clusters with red, green, blue, and yellow were formed. Figure 18 highlights 25 keywords in cluster 1 (red), 14 keywords in cluster 2 (green), 11 keywords in cluster 3 (blue), and 10 keywords in cluster 4 (yellow). The main keywords in cluster 1 are women entrepreneurship, socioeconomics, economic growth, microfinance, developing world, poverty, poverty alleviation, social capital, education, employment, women empowerment, culture, human capital, gender differences, micro-credit, and migration, grouped under the highlights that focus on SDG 1, SDG 5, SDG 8, and SDG 10. The main keywords in cluster 2 are gender, women status, gender equality, self-employment, gender relations, discrimination, and intersectionality, focusing on SDG 5, SDG 8, and SDG 10. In cluster 3, the main keywords are work–life balance, informal economy, sustainability, sustainable development, empowerment, and business development, focusing on SDG 8. In cluster 4, the main keywords are empowerment, innovation, business development, informal economy, sustainability, and sustainable development. Four interesting research themes could be identified—cluster 1: economic growth and sustainable development, cluster 2: gender issues affecting woman entrepreneurship, cluster 3: women entrepreneurs in small and medium enterprises, and cluster 4: women entrepreneurship contributions to sustainability and informal economy.

Using the co-occurrence keyword analysis, we find four interesting research themes: (1) economic growth and sustainable development, (2) gender issues affecting women entrepreneurship, (3) women entrepreneurs in small and medium enterprises, and (4) women entrepreneurship contributions to sustainability and informal economy.

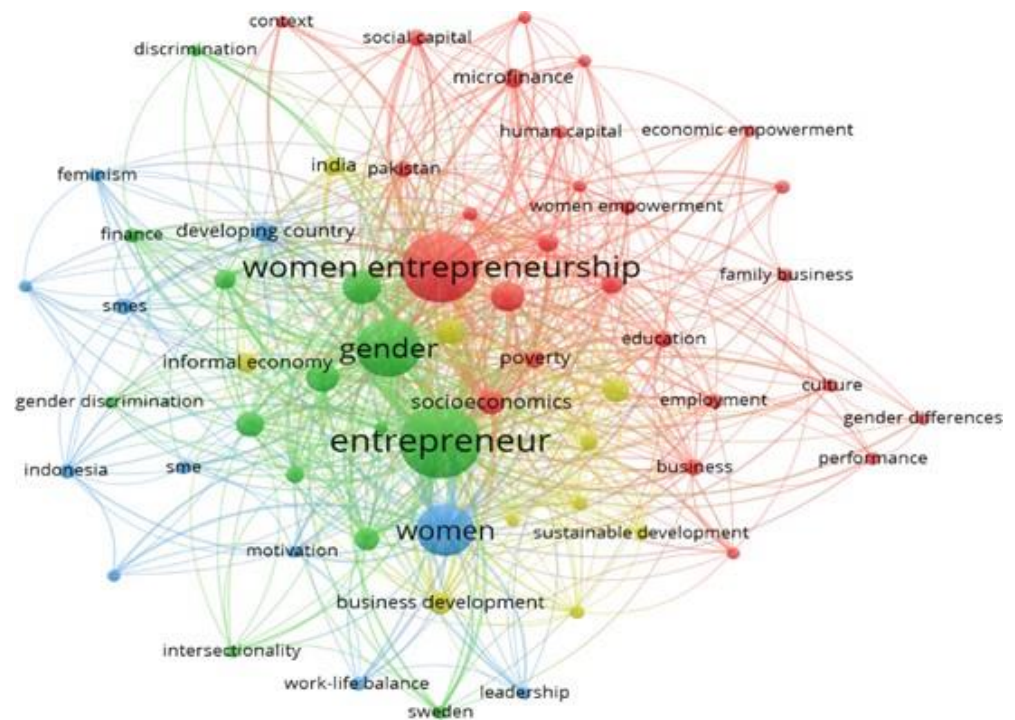


Figure 18. Keyword co-occurrence analysis of women entrepreneurship and SDG.

5.12. Impact of COVID-19

Entrepreneurship is increasingly critical of fuel innovation, economic growth, and societal empowerment. As per the Global Entrepreneurship Monitor 2021 report, the TEA (total entrepreneurial activity) of women globally is 11%. A recent survey-based study [66] indicated that the pandemic impacted 93% of women leading businesses in various sectors from low- and middle-income countries.

The impact of COVID-19 on women entrepreneurs is still a developing and emerging area of research. Over 80 studies have focused on the exogenous effects of COVID on women entrepreneurs from 33 countries. Factors such as business management and coping strategies of women were investigated. From the final global sample of 3157 publications that we arrived at using the SPAR-4-SLR framework, we filtered those with COVID-19 in the abstract and titles. This resulted in 80 publications under study. Ninety (90) percent of these papers focused on regions within a country, and the remainder undertook multi-country studies. Table 10 shows that the low-middle income countries (India and Indonesia) accounted for 33% of all publications, and both countries are also highly populous (India: 1405 million, Indonesia: 274.86 million).

Table 10. Top ten countries focused based on COVID-19 publications.

| Country | TP | % Share |
|---------------|----|---------|
| India | 16 | 20% |
| Indonesia | 10 | 13% |
| Malaysia | 5 | 6% |
| Pakistan | 5 | 6% |
| Brazil | 3 | 4% |
| Zimbabwe | 3 | 4% |
| Italy | 2 | 3% |
| Sri Lanka | 2 | 3% |
| UK | 2 | 3% |
| United States | 2 | 3% |

Note: TP = Total publications.

The relative weakness of Anglo-Saxon countries is noteworthy. However, as seen in Table 11, two of the most frequently cited publications, [27] (TC: 43) and [42] (TC: 20), were from these countries, i.e., the US and the UK. Further, both were published in the same journal—*International Small Business Journal Researching Entrepreneurship*. The next most frequently cited work (TC: 12) was the study “Learning experiences of women entrepreneurs amidst COVID-19” from Pakistan.

Table 11. Major funding organizations and their country.

| TC | AAS | Year | Publication Title | Authors |
|----|-----|------|---|--|
| 43 | 13 | 2020 | Pivoting to stay the course: How women entrepreneurs take advantage of opportunities created by the COVID-19 pandemic | Manolova, Tatiana S; Brush, Candida G;Edelman, Linda F; Elam, Amanda |
| 20 | 6 | 2020 | Bios, mythoi and women entrepreneurs: A Wynterian analysis of the intersectional impacts of the COVID-19 pandemic on self-employed women and women-owned businesses | Dy, Angela Martinez; Jayawarna, Dilani |
| 12 | 2 | 2021 | Learning experiences of women entrepreneurs amidst COVID-19 | Afshan, Gul; Shahid, Subhan; Tunio, Muhammad Nawaz |

Comparing the industry sectors, close to 51% of entrepreneurs in the wholesale/retail industry are women. The pandemic-induced business closures were also the highest in this sector (40%), thus adversely affecting more women than men [67]. It is also well-known that women-led businesses are much smaller than men [68]. This also makes them more vulnerable. The core impediments women faced during the pandemic were associated with being caught off-guard with little or no preparatory time to handle the significant impairment and disruption to the supply and demand networks.

6. Future Research Directions

The findings of this study lead to several areas for further research.

First, the socio-cultural environment plays an inherent role in shaping women entrepreneurs’ resilience to disruptive and stressful situations. Balancing work and responsibilities towards family is a frequently addressed topic of researchers, as stress and anxiety can impede a women’s entrepreneurial zeal. With the high growth in women entrepreneurs in developing nations, a critical area for further investigation is identifying how these women develop social capital, alternate business channels, newer market opportunities, and new technological skills. Several recent studies [69–74] indicate digitization and the adoption of e-commerce as critical for the survival of women entrepreneurs, but examining such issues more closely from a socio-political lens may help to identify challenges related to developing-country idiosyncrasies. Institutional voids and socio-cultural barriers may also vary across different countries, and the increasing research undertaken in more developing countries provides opportunities for more cross-country comparisons. Coping strategies and support for the limitations of women living in predominantly debilitating patriarchal societies remain sparse [75,76].

Second, our findings on existing research trends linking women entrepreneurship and the SDG flags issues related to SDG 10, reducing inequalities, SDG 8, decent work and economic growth, and SDG 5, gender equality, to be the three most frequently cited SDG. Nevertheless, there are 14 other SDG, and in essence, many of the SDG are interconnected. Further studies on both the direct and indirect impacts of women entrepreneurs’ activities and outcomes on other facets of sustainable development would be beneficial, particularly in meeting the 2030 Agenda. For example, the potential impact that women entrepreneurs can have on SDG 13, climate action, through their choice or even generation of climate-friendly products and services can be further explored, and findings would have implications for global movement on climate change. Another area of research relates

to women entrepreneurs' impact on SDG 12, responsible consumption and production, in which avenues to upgrade production and services supported by circular economy technologies can be studied.

Third, COVID-19 has challenged business sustainability in an unprecedented manner. Several vital traits that women should nurture to combat the challenges associated with COVID-19 emerged from past studies. These included self-efficacy, the willingness to learn as well as share knowledge and adopt newer technologies and processes, professionalism in communication and reporting along with adequate proficiency in legal and regulatory aspects concerning their business—the area women are considered least knowledgeable in [77–79]. Another key finding in the GEM 2021 report was that the most significant gender gap in early-stage entrepreneurship activity was found in the internet and communication technologies area, where women were far less proficient than men. These findings indicate important directions for policy research and international development in building resilience among women in emergencies such as the pandemic. The use of sophisticated and emerging technologies such as blockchain and virtual laboratories [80] can potentially enhance their market reach, warranting further studies on this topic. Entrepreneurship in developing economies often tends to be survivalist-natured. COVID-19 reduced entrepreneurial activities for women predominantly hailing from rural and pre-existing impoverished communities, exposing them further to daunting issues related to poverty and unemployment. Governments play crucial mediating roles in entrepreneurial eco-systems and are expected to anticipate and plan for emergencies and disruptions. There was a visible gap in the literature on the implementation of governmental policies and regulations on women entrepreneurs, especially concerning the extent of the motivation and successful facilitation they provided during the COVID-19 period [81–84] in developing economies. Two successful models that took a systems thinking approach to organizing and training women entrepreneurs shed light on the need to explore scalable solutions to build resilience among rural communities [85,86].

Fourth, access to financial capital is critical for innovation and scaling up business models: a lack of money, exacerbated by COVID-19, is one of the critical issues women entrepreneurs face. Few studies have alluded to venture capitalist-backed risk funding, micro-financing, and crowdsourcing as potential survival pathways [68]. Financial literacy also plays an essential role in avoiding asymmetries among women and business partners. In addition, investment in sustainable development is vital to finding long-term sustainability solutions, both for business and society. Future studies may explore and link research on capital investment in the SDG. Since empirical evidence is based on short-term studies, further studies on the long-term impact of COVID-19 on women-led enterprises in high-risk sectors should be pursued. Fundamental questions on how to best prepare women with better resiliency in economic and humanitarian crises remain unanswered. Studies on larger cohorts of women across multiple sectors focusing on improved access, training, and exposure as aids dedicated to women will be significant contributions to developing pragmatic policies and entrepreneurship literature. Future research should model the coordination of economic, social, and business network dimensions to arrive at optimal approaches for entrepreneurs to offset catastrophes in environments similar to the pandemic and effectively adapt to them.

7. Discussion

Our study throws light on the growing body of literature on women entrepreneurship and the inherent complexity and interconnectivity across themes, topics, and countries on issues related to women entrepreneurship. This study identifies three major research themes in the development of women entrepreneurship studies based on keyword co-occurrence networks and the bibliographic coupling of publications. First, the barriers to and catalysts for women entrepreneurship is the most prominent theme, with much of the literature developing in the last decade. For example, there are legal gaps in women's entrepreneurship, including women's property rights and inheritance rights [87], opening

bank accounts, and signing contracts, in many countries [88]. Our findings are consistent with earlier studies calling for women entrepreneurship studies' need to interrogate the impacts of different environmental drivers more widely for women entrepreneurship and their interactions [89].

The second research theme revolves around a large cluster encompassing women's cultural and social practices. Cultural and social practices, such as primary caregiving for children and families and rigid social norms for women's expected behavior, can impact economic outcomes and entrepreneurship [89]. Singer et al. (2018) reviewed 52 economies around the world [90]. They found that women are less likely than men to take up entrepreneurship due to differences in self-perception, culture, and customs, including the participation of women in entrepreneurship. Many studies consider gender a dummy variable or binary conceptualization, and more complex designs are needed to study the impact of gender on women's entrepreneurship [91].

The third research theme relates to economic development and women entrepreneurship. Women's lower self-efficacy and self-perception about their skills, when compared to their male counterparts, may prevent them from engaging in entrepreneurship or applying for finance [10,92]. Studies have pointed out the need for quality entrepreneurship capacity-building programs enhanced with gender-inclusive soft skill development to support women's entrepreneurial success [85].

The most frequently cited publication (TC:941) within the theme of "barriers and enablers to women entrepreneurship" is "Why research on women entrepreneurs needs new directions" by Ahl. A (2006). Within the theme of "economic development and women entrepreneurship", the publication of Poggesi S. (2016), "What's new in female entrepreneurship research? Answers from the literature", is the most frequently cited publication (TC: 80). Within the theme of "gender issues in entrepreneurship", the publication from Malmstrom M (2017), "Gender stereotypes and venture support decisions: How governmental venture capitalists socially construct entrepreneurs' potential", has the highest citation (TC: 81), and the highest citation in the "gendered perspective of entrepreneurship" theme is the publication by Stead V. (2017), "Belonging and women entrepreneurs: Women's navigation of gendered assumptions in entrepreneurial practice" (TC: 459).

The second contribution of our study relates to the relationship between women entrepreneurship and the UN Sustainable Development Goals (SDG). Most sustainable development and women entrepreneurship publications align with SDG 5, SDG 8, and SDG 10. We see four interesting research themes with the SDG-related publications.

1. The most prominent theme, economic growth and sustainable development, has a significant subtheme in SDG 8, supporting the economic growth, empowerment, microfinance, human and social capital that support SDG 8. Another prominent subtheme related to SDG 10, reducing inequalities and sustainable development in this cluster, includes sustainable development, poverty, family business, education, and culture. Women entrepreneurship can help reduce poverty in developing economies [93,94]. Women entrepreneurs seek support and benefit from family members for business [95], and those who employ and manage family members produce higher profits than male entrepreneurs who use family members [96].
2. The second theme, gender issues affecting women entrepreneurship, includes research in SDG 5, such as women's status, discrimination, gender discrimination, and intersectionality. Worldwide reforms that remove laws that discriminate against women in any form—economically, financially, or socially, including their freedom to independently own and sell property—initiate changes that will support gender equality and women entrepreneurship [97].
3. The third theme suggests the strong association of women entrepreneurs with small and medium-sized enterprises, along with research in gender discrimination, intersectionality, and preferences such as work–life balance. Often, women make choices for smaller businesses [98], seek modest growth [99], choose less profitable sectors, and give priority to non-economic outcomes such as better work–life balance, rela-

tionships, and empowerment in the household and community [89]. Women-owned small and medium enterprises in Africa and Latin America were at a higher risk of closing due to non-business-related reasons, including work–life balance and social and cultural norms, rather than for business reasons such as lower profit.

4. The fourth theme contributes to women entrepreneurship and sustainability with thematic research in sustainability, sustainable development, innovation, informal economy, and empowerment. Entrepreneurship for sustainable development was recognized in the UN General Assembly Resolution 2020.

The third contribution is the research on the impact of COVID-19 on women’s entrepreneurship. The effect of COVID-19 clearly showed a significant bias towards women’s empowerment in ICT, digitization, and e-commerce while exposing the need for gender-moderated policies and governmental interventions.

8. Conclusions

This study conducts a bibliometric analysis, and a systematic and technology-facilitated approach is undertaken to analyze literature published between 1991–2021 to better map developments and opportunities within women entrepreneurship research. Previous studies generally excluded the nexus between women entrepreneurship and SDG, and the research on the impact of COVID-19 on women entrepreneurship is in a preliminary stage. To the best of the authors’ knowledge, this study is among the first to expose the linkages between women’s entrepreneurship and the SDG. This study sheds light into the substantial influence of key contributors in terms of the authors, institutions, publications, and ecosystems in women entrepreneurship research. Though this study takes a multi-faceted view of women entrepreneurship from both developed and developing economies, the insights are limited to articles from a single database, Dimensions, that may have missed a few publications. Aside from the three SDGs that emerged prominently in this work, an analysis on the impact of other SDGs with less research on women’s entrepreneurship was not attempted. Finally, from the perspective of the methodology used, there are alternatives to bibliometrics, for example, SLR frameworks such as antecedents-decisions-outcomes (ADO) [100] or theories, contexts, and methods (TCM) [100], that could be applied to the domain to gain different and exciting insights.

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