

Mapping the research landscape: a bibliometric analysis of female labour in the digital economy

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Abstract. The digital economy is expanding rapidly, profoundly reshaping global labour markets and presenting both opportunities and challenges for female labour force participation. Although existing literature has explored this relationship, the academic landscape remains fragmented. This study offers a systematic overview through bibliometric analysis, drawing on a dataset of 552 publications retrieved from the Web of Science (WOS) (1950-2025). Using VOSviewer, this study conducts co-authorship, citation, and co-occurrence analyses. The results reveal a surge in publications since 2017, with the USA, China, and England forming the core collaborative network. Citation analysis identifies foundational literature and key journals, while keyword co-occurrence clustering uncovers four dominant research themes: the gendered labour-time dilemma, the autonomy paradox in the gig economy, trust differences in e-commerce, and gender-differentiated innovation during crises. This study seeks to consolidate the knowledge architecture and provide a foundational reference for future scholarship on gender and digital transformation.

Keywords: digital economy, female labour, gender, gig economy

1. Introduction

The digital economy is developing rapidly and has become a primary engine for global economic recovery [1]. For example, in China, the digital economy expanded to 53.9 trillion yuan in 2023, maintaining a high growth rate and accounting for 42.8% of the national GDP. Its contribution to economic growth was substantial [2]. This acceleration is driven by advancements in online platforms and technologies, which have profoundly transformed global economic structures from traditional industries to service-oriented sectors, and reshaped labour markets [3]. This shift is not merely technological but also socio-economic, redefining the nature of work and employment patterns. As digitalisation continues to permeate everyday life, understanding its impact on labour dynamics—particularly for vulnerable groups—becomes imperative [4]. Among these, female labour force participation is a critical area of inquiry, as digital platforms promise greater flexibility and access to income, yet may also perpetuate or exacerbate existing gender inequalities [5].

Scholarly work on the digital economy and female labour participation has grown considerably, exploring diverse aspects such as platform-based work, female entrepreneurship, and the transformation effects of digitalisation on labour markets. As Alon et al. observe, digitalisation influences female labour participation through mechanisms such as flexible work arrangements, remote employment, and expansion of the service sector [5]. Other scholars have investigated the potential of digital tools to mitigate gender discrimination by enhancing transparency and reducing information asymmetry in hiring and compensation practices [6]. In the realm of entrepreneurship, digital finance has emerged as a key enabler, lowering barriers to entry and offering new pathways for women's economic participation [7]. Despite these valuable contributions, the literature remains fragmented, with studies often focusing on specific sectors, regions, or theoretical lenses without a unified framework. This fragmentation limits the ability to identify overarching trends, intellectual networks, and evolving research priorities.

Thus, a comprehensive analysis of the research situation is essential. Bibliometric methods offer a rigorous means of mapping intellectual structures, tracing developmental pathways, and identifying emerging themes within a field. Accordingly, this study employs bibliometric analysis to synthesise and visualise the body of existing research on the digital economy and female labour force participation. Through systematic co-authorship, citation, and co-occurrence analyses, the study aims to construct a holistic view of research in this domain.

The research is guided by the following questions:

RQ 1: How has the field evolved, and where is it geographically concentrated?

RQ 2: Which authors and publication sources contribute the most influential literature?

RQ 3: What are the most frequently discussed topics?

2. Research methodology

2.1. Methods

Bibliometric analysis was employed to systematically investigate the research landscape linking the digital economy and female labour force participation. This quantitative approach evaluates the structure of influence and collaboration among publications, authors, institutions, and countries [8]. It enables the assessment of research performance and the mapping of knowledge architecture and developmental trends within a scholarly domain [9]. VOSviewer (version 1.6.20) was used as the primary software tool for analysis and visualisation.

This study applied co-authorship analysis, citation analysis, and co-occurrence analysis across five dimensions: temporal distribution of literature, documents, journals, countries and keywords [10]. Firstly, this study examined changes in publication volume over time to assess shifts in scholarly attention [11]. Secondly, co-authorship was adopted to map global collaboration among countries, identifying top contributors and key hubs of scholarly cooperation [12]. Thirdly, citation analysis was used to evaluate the impact of research outputs, revealing foundational documents and journals that reflect past research topics and dominant publication platforms [13,14]. Finally, keyword co-occurrence analysis was employed to map relationships among high-frequency terms, identifying core research themes and their interconnections within the digital economy literature [8].

2.2. Data collection

This WOS database was used for literature retrieval. Covering multiple disciplines, including economics, social sciences, and women's studies, it is an ideal source for exploring the intersection of the digital economy and gendered labour participation [15]. A total of 552 valid publications on female workforce participation within the digital economy, published between 1950 and 2025, were selected for analysis.

The search strategy combined terms such as 'digital economy' OR 'gig economy' OR 'platform economy' AND 'female employment' OR 'women employment' OR 'gender and work,' using Boolean operators. This search was limited to articles, while non-peer-reviewed literature, conference proceedings and book chapters were excluded [16]. This yielded a sample of 648 peer-reviewed publications. Only English-language papers were considered [17]. After applying the inclusion criteria, the final corpus comprised 552 articles.

3. Results and findings

3.1. Analysis of temporal distribution

This section examines annual publication distributions from 1980 to 2025 (see Figure 1). By statistically analysing the publication volume and its temporal distribution, it is possible to trace how academic attention to female labour force participation has changed over time [18].

The period from 1998 to 2016 marked the initial stage, with fewer than 10 publications each year. This topic mainly appeared sporadically within broader research frameworks such as Business Economics or Computer Science. Since 2017, with the rise of gender studies and the theoretical expansion of digitalisation in issues such as the labour market, research interest in this field has gradually increased. Annual publication counts first surpassed 15 in 2017. From 2018 onwards, the number of documents maintained a growth trend, increasing from 21 to 82 per year, indicating the gradual formation and stable development of 'Digital Economy and Female Labour Force participation' as an independent research direction.

Since 2020, the field has entered a stage of rapid development. The number of papers published annually has remained above 50, reaching a peak of 90 in 2024. This trend may be driven by several factors: the ongoing expansion of the global digital economy, increased inclusion of women in the workforce, and the application of large-scale experimental methods and data analysis. As of 2025, 50 articles have been recorded so far. Considering the time point of data collection, this number is expected to continue rising.

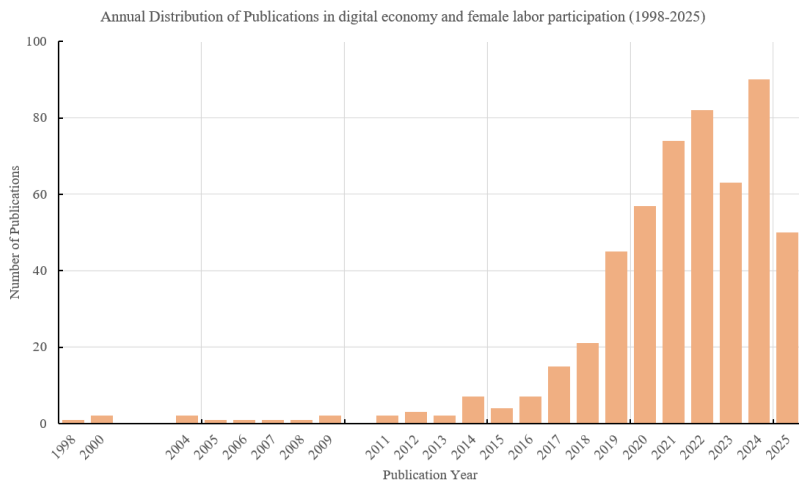


Figure 1. Annual scientific production

3.2. Analysis of spatial distribution

To further understand the global research landscape on the digital economy and female labour force participation, this section examines the geographical distribution of publications and their international collaboration network. Table 1 ranks countries by their total publication output, with the United States, China, and England ranked in the top three positions. Other major contributors include Australia, Spain, Canada, the Netherlands, Germany, Austria, and Sweden. The USA leads with over one hundred papers, ahead of China and other countries.

Based on the quantitative data in Table 1, aside from the USA, China (83 papers), England (61 papers), Australia (44 papers), Spain (32 papers), and Canada (31 papers) also demonstrate solid research foundations and potential for collaboration. It is worth noting that some countries, such as Germany (21 papers, link strength 69), Austria (10 papers, link strength 69), and Sweden (9 papers, link strength 10), have relatively low publication volumes but maintain close connections with core countries, indicating higher research quality or deeper cooperation.

Table 1. Top 10 countries by documents, citations, and total link strength

Rank	Country	Documents	Citations	Total Link Strength
1.	USA	118	3285	162
2.	People’s R China	83	1032	85
3.	England	61	1459	108
4.	Australia	44	1523	107
5.	Spain	32	344	29
6.	Canada	31	629	33
7.	Netherlands	23	633	78
8.	Germany	21	461	69
9.	Austria	10	126	44
10.	Sweden	9	105	10

Source: Author’s elaboration using VOSviewer

To illustrate international cooperation in research on the digital economy and female labour force participation, this study constructs a national cooperation network diagram based on co-authorship data. According to publication output and collaboration patterns, the 25 major countries are grouped into six clusters (see Figure 2).

As shown in Figure 2, the USA occupies the central position in the cooperation network, with 118 related documents and the highest publication count. Its total link strength of 162 far exceeds that of other countries, indicating its leadership in both academic influence and collaboration activity. The USA maintains close cooperative relationships with England, Australia, China, and Canada, demonstrating its strong international leading role. Among them, the USA, England, and Australia form a core triangle, with their cooperation intensity exceeding 40% of the global cooperation volume.

Meanwhile, several regional cooperative groups can also be identified. Germany, the Netherlands, Spain, France, Scotland, and Denmark form a European cluster, connecting with the USA and England to access the global research network. In the Asia-Pacific region, China, Australia, Pakistan, Vietnam, Japan, and Bangladesh have formed another cooperation circle. Saudi Arabia and Malaysia constitute an Islamic academic circle. Although Austria and the Czech Republic have lower publication volumes, they maintain close cooperation with European countries. Additionally, among African countries, only South Africa is actively involved, relying on England and the USA for collaboration. Countries on the periphery of the network, such as Saudi Arabia, Malaysia, and Finland, have limited publication output and have not established cooperative connections with core countries, indicating a gap in international cooperation.

Overall, research on the digital economy and female labour participation has formed a global cooperation network centred on the USA, with widespread academic integration and active cooperation. Regional cooperation systems are increasingly evident, providing a theoretical basis for the subsequent design of cooperation policies. However, regional cooperation networks still rely on the connecting role of core countries such as England, the USA and Australia.

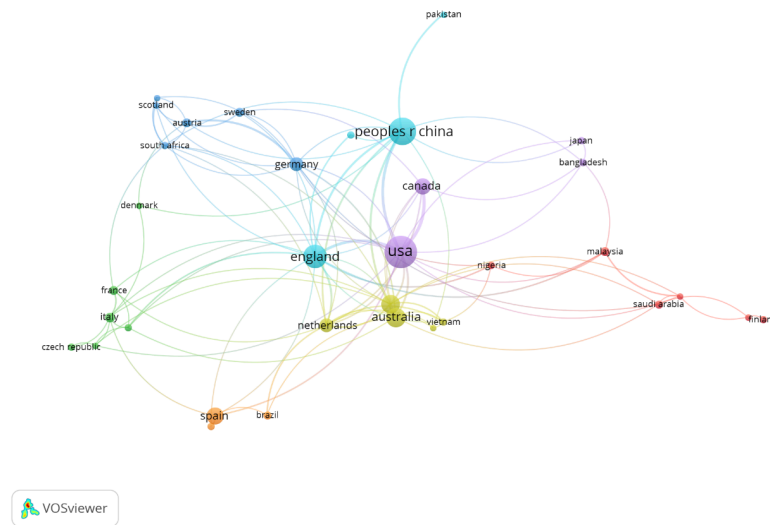


Figure 2. Co-authorship analysis based on countries

Source: Author's elaboration using VOSviewer.

3.3. Analysis of journal distribution

This section analyses both the journal outlets and the core literature within the field. Table 2 lists the top ten most frequently cited articles in the study sample. The article by Goyal and Kumar in the *International Journal of Consumer Studies* ranks first with 487 citations [19]. It provides a systematic review of digital financial knowledge and explores how financial knowledge varies across demographic groups. The study notes that women - particularly older women - tend to have lower financial literacy, with educational quality cited as a key factor. This work is foundational in linking the digital economy to women's employment.

The second most cited article, published by van Doorn in *Information Communication and Society*, analyses workforce distribution in the platform economy from a gendered perspective [20]. Third is the article published by Duffy and Hund in *Social Media Society*, which discusses female labour force participation in the digital media economy [21]. Duffy's solo work on gender differences in the digital cultural industry and the concept of 'aspirational labour' also ranks among the top five [22].

These highly cited articles span themes such as the digital economy, platform economy, gender differences, female labour force participation, and education, reflecting the interdisciplinary nature and practical relevance of research in this field.

Table 2. Most cited articles

Rank	Title	Authors	Citations
1.	'Financial literacy: A systematic review and bibliometric analysis'	Goyal & Kumar [19]	487
2.	'Platform labor: on the gendered and racialized exploitation of low-income service work in the 'on-demand' economy'	Van Doorn [20]	451
3.	'Having it All on Social Media: Entrepreneurial Femininity and Self-Branding Among Fashion Bloggers'	Duffy & Hund [21]	356
4.	'The romance of work: Gender and aspirational labour in the digital culture industries'	Duffy [22]	317
5.	'Examining the moderating effect of individual-level cultural values on users' acceptance of E-learning in developing countries: a structural equation modelling of an extended technology acceptance model'	Tarhini et al. [23]	228
6.	'A critical framework for interrogating the United Nations Sustainable Development Goals 2030 Agenda in tourism'	Boluk et al. [24]	213
7.	'Antecedents and Consequences of Customer Satisfaction: Do They Differ Across Online and Offline Purchases?'	Hult et al. [25]	174
8.	'Trusted strangers: Carework platforms' cultural entrepreneurship in the on-demand economy'	Ticona & Mateescu [26]	157
9.	'Anomaly Detection in Dynamic Graphs via Transformer'	Liu et al. [27]	141
10.	'Analysis of EEG signals and its application to neuromarketing'	Yadava et al. [27]	

Source: Author's elaboration using VOSviewer.

Core journals, ranked by publication count and total citations, are listed in Table 3. New Technology Work and Employment and Gender Work and Organisation jointly topped the list, each publishing nine relevant articles with total citation counts of 155 and 139, respectively. This shows their important role in research on the digital economy and female labour force participation. Other notable journals include Critical Sociology (8 documents), Information Communication Society (6 articles) and the Journal of Industrial Relations (6 documents), indicating the extensive infiltration of the theme in the fields of social sciences, information society, and industrial relations.

In terms of the total number of citations, Information Communication Society and Social Media Society ranked highest, with 611 and 418 citations, respectively, indicating that individual high-impact articles from these two journals have contributed to their influence. Journals such as New Media Society and Feminist Media Studies also rank among the top ten, reflecting the theoretical depth and interdisciplinary integration of research on digital technology, platform economies, and women's studies.

Table 3. Journal by documents and citations

Rank	Journal	Documents	Citations
1.	New Technology Work and Employment	9	155
2.	Gender work and Organization	9	305
3.	Critical Sociology	8	139
4.	Information Communication Society	6	611
5.	Journal of Industrial Relations	6	160
6.	Social Media Society	6	418
7.	New Media Society	5	252
8.	Feminist Media Studies	5	75
9.	European Journal of Cultural Studies	5	55
10.	Frontiers in Psychology	5	37

Source: Author's elaboration using VOSviewer

3.4. Keyword co-occurrence

To determine the core topics and their internal connections, this paper conducted a co-occurrence analysis of all keywords. By setting the minimum occurrence frequency of keywords to 10, a keyword co-occurrence network was constructed, resulting in a visual graph containing 68 keywords and 4 clusters (see Figure 3). The analysis revealed a research structure centred on 'digital economy' and 'female employment participation,' which can be further divided into four main research directions.

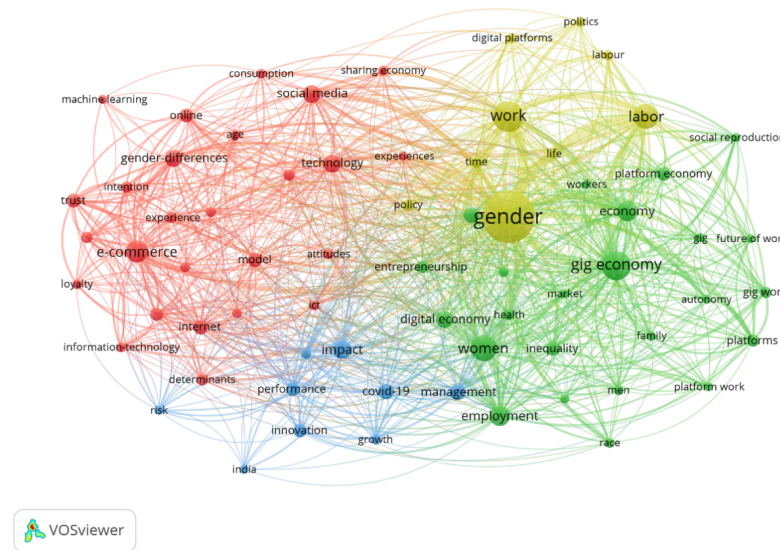


Figure 3. Co-occurrences of keywords

Source: Author's elaboration using VOSviewer.

3.4.1. Yellow cluster: the gendered labour-time dilemma from a policy perspective

The yellow cluster is centred on keywords such as 'gender,' 'work,' and 'labour,' forming a research direction focused on female labour force participation and work patterns [29]. The emergence of keywords like 'digital platforms,' 'policy' and 'politics' indicates that research pays close attention to policy and institutional design, highlighting that the development of the platform economy lacks targeted legal safeguards and protection systems, which may reinforce or even exacerbate gender inequality and job insecurity (e.g. Japan's side business) [30]. Keywords such as 'life' and 'time' suggest that this research field often explores the gendered labour-time dilemma in the platform economy, particularly regarding work-life balance challenges. The blurring of work-life boundaries arises from the absence of supportive policies [31].

3.4.2. Green cluster: the paradox of social reproduction and autonomy

The green cluster revolves around keywords including 'gig economy,' 'digital economy,' 'women,' and 'employment.' This research direction focuses on the structural contradictions in female labour participation in the digital era and encompasses related themes such as social reproduction [32,33]. For example, women in the platform economy often assume dual roles, being both the bearers of social reproduction, such as household part-time jobs, while independently starting businesses through e-commerce to participate in labour and overcome class barriers [34]. However, the emergence of the keyword 'inequality' reveals the tension between the autonomy promised by the platform economy and the persistence of inequality. Gender bias has undermined the 'flexible autonomy' that digitalisation claims to offer [30,35]. This direction profoundly reveals the double-edged nature of the digital transformation for women workers, providing opportunities while also deepening systemic exploitation.

3.4.3. Red cluster: gender trust differences in technological intermediation

The red cluster is centred on the keywords 'e-commerce,' 'gender differences,' and 'technology.' This field investigates the relationship between internet skills and gender bias in e-commerce [36]. It also incorporates keywords such as 'social media,' 'internet,' 'intention,' and 'experience' to explore how internet skills can enhance women's employment intentions and break

gender barriers [37,38]. The keywords 'trust' and 'loyalty' reveal the limitations of technological empowerment in the construction of trust and loyalty in business relationships [39]. The emergence of the keyword 'model' indicates that, through empirical or experimental methods, it can be validated that internet skills can break gender barriers and replicate gender biases in business trust within this research direction [38].

3.4.4. Blue cluster: the innovative gender effect in crisis response

The blue cluster focuses on the causal link between gender factors and enterprise innovation and performance. Key terms include 'impact,' 'performance,' 'management,' 'innovation,' and 'growth.' This research direction explores the differences in the effects of top management's gender composition on enterprise performance and digital innovation (such as e-commerce and remote work technologies) [40,41]. Moreover, the keyword 'Covid-19' indicates that the researchers are exploring the differences in gender factors in risk-taking preferences in the context of crisis response [42].

3.5. The co-occurrence frequency of key words

To identify the most representative core terms in research related to the digital economy and female labour participation, this paper conducted a statistical analysis based on keyword co-occurrence frequency (see Table 4). After setting the minimum co-occurrence frequency threshold at 10, the analysis incorporated 68 keywords. The frequency statistics show that 'gender' (180 times) is the most frequently co-occurring keyword, clearly reflecting the centrality of the gender perspective in this research field. Following this are 'work' (74 times), 'gig economy' (69 times), 'women' (55 times), and 'labour' (54 times), which collectively point to the general concern about the labour forms and gender differences within the digital economy.

Meanwhile, the frequent appearance of 'employment' (38 times) and 'economy' (36 times) indicates that research topics are closely connected to economic transformation and the labour market integration. These terms reflect gendered discussions on key dimensions such as social reproduction, autonomous entrepreneurship, gender bias, business trust differences, enterprise performance, policy impacts, and labour-time dilemmas. Additionally, keywords like 'e-commerce' (41 times), 'technology' (30 times), and 'impact' (33 times) demonstrate sustained scholarly interest in e-commerce activities, as well as their technology-driven impact mechanisms.

Table 4. Keyword co-occurrence (top 10)

Rank	Keyword	Cluster	Occurrences	Total Link Strength
1.	gender	1	180	500
2.	work	1	74	239
3.	gig economy	2	69	209
4.	labor	1	54	190
5.	women	2	55	164
6.	economy	2	36	129
7.	employment	2	38	123
8.	e-commerce	3	41	114
9.	technology	3	30	108
10.	impact	4	33	100

Source: Author's elaboration using VOSviewer.

4. Conclusion

Conducting a systematic bibliometric approach, this investigation maps the research landscape connecting the digital economy and female labour force participation, based on 552 publications authored from 1950 to 2025. Using VOSviewer, this research applied co-authorship, citation, and co-occurrence analyses to systematically map the intellectual structure and evolving trends in this field. The annual publication output revealed a significant growth in scholarly attention since 2017, peaking in 2024, reflecting rising global interest in the gendered implications of digital economic transformations.

In terms of spatial distribution, co-authorship analysis of countries identified the USA, China, and England as central nodes within a collaborative network, with clearly formed regional clusters in Europe and the Asia-Pacific region. This illustrates the globalised yet unevenly distributed nature of research cooperation. Citation analysis of documents and sources pinpointed key influential documents and core journals that have shaped major discourses around financial literacy, platform labour, and gendered work patterns. Finally, keyword co-occurrence analysis uncovered four dominant thematic clusters: gendered labour-

time dilemmas under policy constraints, the paradox between social reproduction and autonomy in the gig economy, technology-mediated trust differences in e-commerce, and gender-differentiated innovation responses during crises. These clusters reflect the field's complex structure, intersecting economic, technological, and social dimensions of female work.

Despite these insights, this study has several limitations. Firstly, relying exclusively on the WOS to obtain data might result in the omission of pertinent literature available in other databases. Secondly, the search strategy relied on a limited set of keywords, which might not capture the full spectrum of related research. Additionally, while the visualisations generated by VOSviewer are useful, they can become complex when representing large networks, potentially affecting interpretability. Future research could expand data sources, incorporate more diverse search terms, and apply mixed-methods approaches to advance the understanding of gender dynamics within the digital economy. Nonetheless, this bibliometric review provides a solid framework for comprehending the current state and future directions of this evolving field.

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