



Building reflexivity in the age of risk society: Bibliometric analysis of women's participation in realizing food sovereignty

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ABSTRACT

Background: The global food crisis has placed modern food systems within the framework of a risk society. Women's participation in food sovereignty is a critical response to this risk. However, specific bibliometric mapping on this topic as a form of collective reflexivity is still lacking. This study aims to map literature trends (2009-2025) and interpret them using Beck's risk society theory. **Methods:** This study applied bibliometric analysis to 25 documents from Scopus (2009–2025). Data were analyzed using Biblioshiny to map scientific performance and structure. The findings were then interpreted qualitatively through Beck's theoretical framework of risk society and reflexivity. **Findings:** This field is highly specialized and stagnant (0% growth rate), but highly collaborative (no single authors-publication). There has been a shift in discourse from food security (a mature theme) to the dominant food sovereignty after 2020. The thematic map shows gender, collective rights, and participatory action research as the main driving themes. Theoretically, this is interpreted as reflexive modernization, where women's participation is a subpolitical practice that actively challenges food system risks. **Conclusion:** Women's participation in food sovereignty is a concrete manifestation of reflexive modernization and subpolitics that shifts from a technocratic focus to participatory justice in addressing food risks. **Novelty/Originality of this article:** The originality of this research lies in the use of Beck's risk society theory to interpret bibliometric data on women's participation in food sovereignty, proving a shift in discourse as a reflexive response to risk.

KEYWORDS: reflexivity; risk society; women participation; food sovereignty; bibliometric

1. Introduction

The global food crisis has become a major problem in realizing sustainable development in the 21st century, which has a direct impact on the quality and fulfillment of human needs (Ajeigbe & Ganda, 2024). Furthermore, climate change, environmental degradation, and unequal distribution of resources have caused millions of people in various parts of the world to face food insecurity (Raymond et al., 2021). This phenomenon is in line with what Beck (1992) stated, that in the era of advanced modernity, the world is faced with various systemic risks to the environment, including food security. Furthermore, for Beck, this modernity has brought uncertainty to humans rather than the promised progress. In this context, food production in the modern era only pays attention to predictability and output calculations rather than quality and environmental sustainability.

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As a consequence, society has now entered an era characterized by risk, facing various ecological impacts such as soil fertility decline, biodiversity loss, and social burdens on local communities that support food security. Policies that only focus on increasing food production without considering environmental impacts are also often unsuccessful and unsustainable (Ajeigbe & Ganda, 2024; Edwards et al., 2024).

Amidst this complexity, the idea of food sovereignty has emerged as a critical reading of the dependence on the modern food paradigm (Cadavid et al., 2024). Food sovereignty gives communities full access to control and oversight of their food systems, inclusivity in decision-making, and principles of ecological and social justice (Abdul et al., 2024). From Beck's (1992) perspective, food sovereignty represents a manifestation of collective reflexivity in modern society, specifically an awareness that enables communities to resist, adapt to, and confront the risks posed by a food system dominated by a modern paradigm that neglects sustainable practices. This collective reflexivity also applies to women as a marginalized group trying to reorganize the structure of food production and distribution. In other words, food sovereignty is not only about food production in terms of quantity but also about how it is produced and who has rights in the process.

Based on this scheme, the manifestation of women's roles is becoming more apparent. Recently, women's participation in sustainable development actions has become mainstream in studies in the field of food sovereignty (Calvário et al., 2020; Calvário & Desmarais, 2023; Collins, 2022; Masson et al., 2017; Turner et al., 2022). In sustainable development and food sovereignty, Portman (2018) states that women's participation, knowledge, and labor are considered to have a major contribution in supporting local food systems, biodiversity, and traditional practices that are crucial for food sovereignty. Not only that, women also play a role as the main guardians of seeds, agroecological knowledge, and culinary diversity, ensuring the preservation and continuation of vital agricultural practices and plant varieties (Patria, 2013). Research by Cadavid et al. (2024) highlights that gender is one of the important indicators in the implementation of food sovereignty. This means that the role of women is not only limited to the social dimension but is also a strategic element in the success of a sustainable food system. This draws attention to the fact that in the context of a risk society, women are not only classified as affected parties. Rather, they are whole subjects who engage in reflexivity that counteracts the impact of food system risks through self-reliance and creativity.

Academically, the development of scientific discourse on women in food sovereignty has become an urgent issue that has been discussed in various scientific literature (Bezner Kerr et al., 2019; Calvário & Desmarais, 2023; Clement et al., 2019; Delormier & Marquis, 2019; Mann, 2019; Ruiz-Almeida & Rivera-Ferre, 2019) by applying reflexivity in the realm of knowledge. Therefore, the bibliometric analysis approach is very relevant. Through this method, researchers can map publication trends, collaborations between researchers, dominant themes, and research gaps in disciplines (Nobanee et al., 2021). Recent bibliometric studies, such as "A Bibliometric Analysis of Governance for Food Security: Global Trends and Future Research Directions" conducted by Ooi & Thangadurai (2025), have attempted to explore global patterns in food governance through the Scopus database, as well as bibliometric analysis of sustainable food systems (Diaconeasa et al., 2024). Not only that, there are also recent bibliometric analyses that examine and link food sovereignty and climate change, such as in the research by García-Marín et al. (2025). However, to date, research in the field of women's participation as a form of food sovereignty reflexivity has not been studied, so this research will contribute to the idea of women's role in realizing the concept of food in an era of risk society.

With the background described above, this study has several objectives: 1) to map global literature trends on women's participation in food sovereignty; 2) to identify priority themes; and 3) to interpret the bibliometric results through the analytical framework of risk society and reflexivity theory from Beck (1992). This study is expected to enrich academic discourse and serve as material for critical reflection for policymakers and practitioners of women's empowerment in a sustainable food system.

2. Methods

To gain an understanding of the objectives of this study, an exploratory study was conducted based on secondary sources of information using bibliometric analysis (García-Marín et al., 2025). Furthermore, quantitative bibliometric analysis was used to analyze the literature produced over the past 16 years on women's participation in food security. Bibliometric analysis was also used to identify the number of annual publications, citations, theme development, and contributions by authors and journals. Most importantly, this analysis enabled researchers to identify emerging trends in specific research areas (Donthu et al., 2021; Thangavel & Chandra, 2023). Afafe et al. (2022) note that this technique is a valuable tool used by researchers to base their conclusions on aggregate bibliographic data from other scientists in the same field who convey their views through writing, citations, and collaboration. Compared to other research techniques or methods, bibliometric techniques have been widely applied in food sovereignty fields, such as climate change (García-Marín et al., 2025), sustainable development and food security (Diaconeasa et al., 2024; Ho & Lwesya, 2025; Ooi & Thangadurai, 2025), and food entrepreneurship (Adithya et al., 2025). Therefore, researchers explored the Scopus database, using Boolean searches to identify relevant literature published in recent years with the following search strategy: (TITLE-ABS-KEY (food sovereignty) AND TITLE-ABS-KEY (women) AND TITLE-ABS-KEY (women participation)) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "ch") OR LIMIT-TO (DOCTYPE , "cp")) AND (LIMIT-TO (LANGUAGE , "English")).

This study was conducted in several stages. First, scientific publications were searched for and collected from the Scopus indexed database for the period reflecting current dynamics, namely 2009–2025. Second, the data was filtered and cleaned to ensure metadata consistency and to remove duplicates or non-peer-reviewed publications. Third, bibliometric analysis (Donthu et al., 2021) was performed using articles indexed in the Scopus database using the Biblioshiny package from Bibliometrix (Aria & Cuccurullo, 2017) in R Studio to analyze publication performance, including performance analysis of the number of publications per year, author keywords, and major journals using Bradford's Law, as well as scientific network mapping through techniques such as keyword analysis, citation analysis, and bibliographic coupling. Fourth, visualization and interpretation of results using bibliometric software with the R package (Bibliometrix) to generate network maps, theme clusters, and the temporal evolution of research topics. Fifth, theoretical interpretation of the mapping results through Ulrich Beck's theoretical framework, particularly the concepts of Risk Society and Reflexivity, to understand how the literature reflects awareness (reflexivity) of the food system risks faced by women and how women's participation is framed in the discourse of food sovereignty.

Operationally, this study sets inclusion criteria, namely 1) articles, book chapters, and conference papers that include keywords such as "food sovereignty," "women," "gender," "sustainability," and "food security" in Indonesian and English to capture the international landscape; 2) published in Scopus-indexed peer-reviewed journals; 3) published between 2009 and 2025. "sustainability" and "food security" and are in English in order to capture the international landscape; 2) published in Scopus-indexed peer-reviewed journals; 3) published between 2009 and 2025 in order to capture the latest developments. The exclusion criteria include: 1) data papers, articles in press, and books; 2) documents written in Portuguese and Spanish; and 3) research areas related to biology, medicine, and engineering. The implication of applying these inclusion and exclusion criteria is that a total of 25 documents containing studies on women's participation in food sovereignty were obtained for further analysis with Biblioshiny. This corpus of 25 documents was explicitly cross-checked and validated against known seminal publications in the field (e.g., Kassam, 2009; Patel et al., 2015) to ensure reliability and validity, confirming that the dataset indeed represents the core literature on this specific intersection of topics. Finally, the data was extracted in metadata format (title, author, institution, country, year, citations, keywords) and analyzed quantitatively. The thematic mapping stage was then interpreted qualitatively

within the framework of reflexivity and risk society to provide a “re-reading” of the scientific structure that was formed.

3. Results and Discussion

3.1 Descriptive analysis

Figure 1 shows the results of an analysis of 25 documents obtained from the Scopus database. This bibliometric analysis paints a picture of a highly specialized, mature, yet stagnant field of research. With only 25 documents published over a 16-year period (2009-2025), the key metric is an annual growth rate of 0%, indicating that this field is not a rapidly developing hot topic. However, the nature of the research shows high-quality standards, where collaboration is an absolute necessity. This is evidenced by the fact that out of 131 authors, none of the documents were written by a single author (0 single-authored).

Instead, research in this field is driven by relatively large teams, with an average of 6.72 authors per document, and has a strong global network, as seen in the 32% international collaboration rate. Despite its low production volume, the research impact is solid, with an average of 13.6 citations per document, and the data corpus is relatively modern, with an average age of 6.32 years. Overall, this is a niche field dominated by large research groups. However, one short remark is necessary regarding the anomaly of zero references (“References: 0”) in the data overview (Figure 1). This is due to a known metadata extraction limitation or parsing error from the Scopus database during the export process. Unfortunately, this prevents a more in-depth co-citation or bibliographic coupling analysis for this specific dataset.



Fig. 1 Data overview

3.2 Annual scientific production

Figure 2 shows the results of an analysis of annual scientific production graphs, indicating a highly specialized (niche) field of research with a limited volume of publications. The trend over a 16-year period (2009-2025) shows extreme fluctuations and a lack of consistent growth, confirming the previous finding of an Annual Growth Rate of 0%. The early period of 2009-2014 can be identified as a dormant or pioneering phase, marked by a lack of publications in several years. There was a significant surge in 2015, which peaked at 4 articles, possibly representing the output of a collective research project or the publication of a special edition. However, this momentum was not sustainable, as evidenced by a drastic decline back to zero articles in 2017. Although more frequent activity has been observed since 2020, the pattern that has formed remains sporadic and incidental, with research not flowing cumulatively but appearing in irregular bursts.

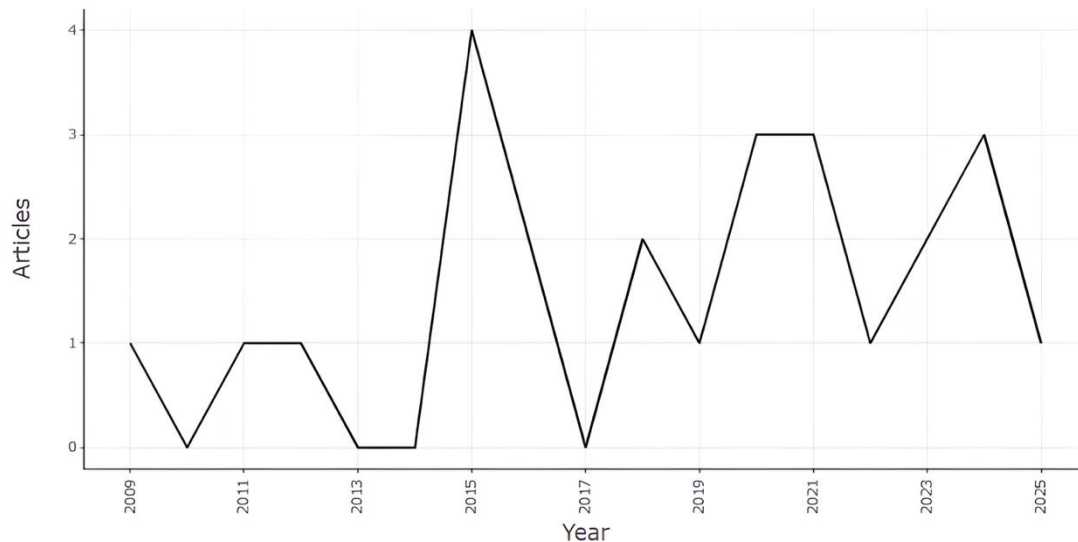


Fig. 2. Annual scientific production

3.3 Most influential journal: Bradford's Law

Based on the results of Bradford's Law analysis generated through Biblioshiny, Figure 3 shows the distribution of publications indicating a number of core sources that are the center of knowledge dissemination on the topics of women's participation and food sovereignty. The graph shows that only a few journals are in the core zone, namely Agroecology and Sustainability, African Journal of Food, Agriculture and Food Security, and Asian Social Science.

These four journals are the most productive sources with the highest contribution to the total number of articles analyzed. Beyond the core zone, the number of articles per journal decreases significantly, indicating that research in this field is still concentrated in a small number of publication sources. This finding is consistent with Bradford's Law, whereby a small number of journals produce a large proportion of the total relevant articles, while most other journals contribute only a small amount (Gourikeremath et al., 2021). This pattern confirms the importance of these core journals as the main channels for the dissemination of scientific discourse on women's participation in food sovereignty and indicates the main direction of reference for researchers who wish to deepen their studies in this field.

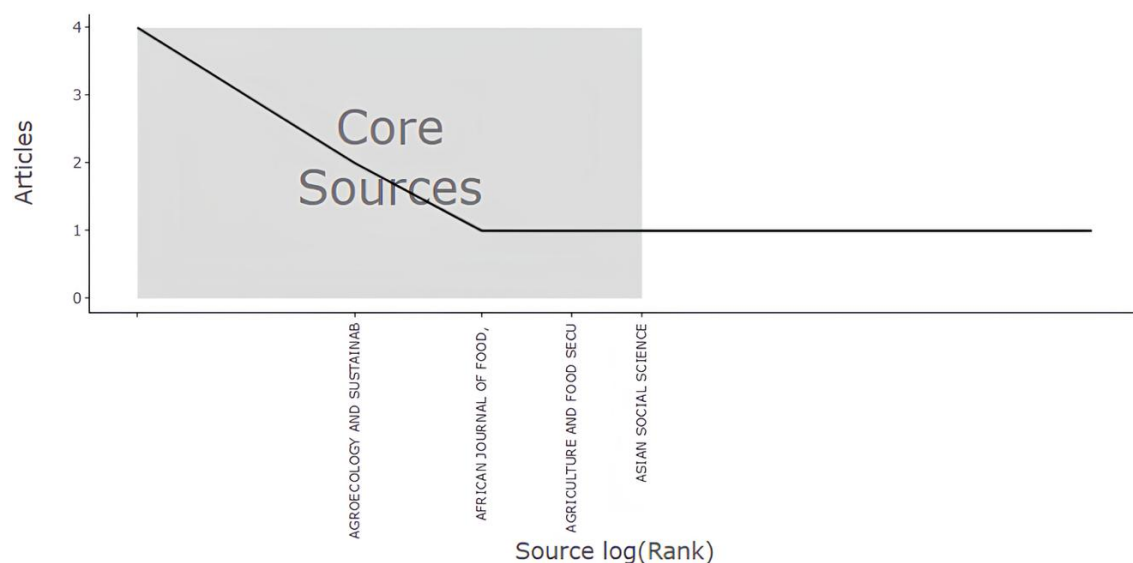


Fig. 3. Bradford's Law on women participation and food sovereignty

3.4 Most influential document

Table 1 presents the findings of Biblioshiny's analysis of the 10 articles that have had the most influence on the development of discourse on women's participation in food sovereignty. Table 1 shows that the article ranked highest is "Viewing change through the prism of indigenous human ecology: Findings from the Afghan and Tajik Pamirs," researched by Kassam (2009) and published in *Human Ecology* in 2009 with a total of 70 citations. This work is widely cited because it offers an indigenous human ecology framework for reading socioecological change in the Pamirs. Kassam (2009) shows how local knowledge, subsistence practices, and human relations with the environment shape adaptive responses to the pressures of change. The reconstruction of indigenous community experiences provides strong empirical contributions and high policy relevance for culturally sensitive and sustainable development. In second place is the article "The Interplay Between Household Food Security and Wellbeing Among Small-Scale Farmers in the Context of Rapid Agrarian Change in India," researched by Patel et al. (2015) and published in the journal *Agriculture and Food Security* with a total of 41 citations. Patel et al. (2015) analyzed the relationship between household food security and the well-being of smallholder women farmers in India in the context of rapid agrarian change. The findings show that agricultural policies and access to resources affect workload, decision-making, and nutritional status at the household level. This article reinforces the argument that food security interventions must prioritize gender dimensions and equitable distribution of benefits.

Another influential document in the field of women's participation and food sovereignty is "Indigenous Food Sovereignty And Tourism: The Chakra Route In The Amazon Region Of Ecuador" by Santafe-Troncoso & Loring (2021). This third document was published in the *Journal of Sustainable Tourism* with a total of 38 citations. The study by Santafe-Troncoso & Loring (2021) uses the case of the Chakra Route in the Ecuadorian Amazon to examine how tourism can be a vehicle for strengthening the food sovereignty of indigenous peoples. The researchers show that income diversification through cultural tourism can support local food systems, strengthen culinary identity, and encourage agroecological conservation. The policy implications emphasize community-based tourism design that protects land and seed rights. Next is a document with a total of 35 citations, namely the study by Guariguata et al. (2020). The Guariguata et al. (2020) study applies group model building to map the drivers of food and nutrition systems in Small Island Caribbean States. Through stakeholder engagement, researchers mapped policy feedback, supply chains, and social factors that influence food consumption. The result is a causal map that helps determine leverage points for community nutrition interventions while offering a participatory methodology that can be replicated in other island regions. A study by Nigh & González Cabañas (2015) comes in fifth place with 32 citations. The research by Nigh & González Cabañas (2015) explores reflexive consumer markets and alternative food networks in Mexico and France. Nigh & González Cabañas (2015) argue that direct relationships between producers and consumers, transparency in production processes, and agroecological values can build food sovereignty from the bottom up. This article provides theoretical and empirical justification for strategies to expand alternative food networks that combine ethical, environmental, and social justice motives.

These five documents form a complementary canon of references. One work provides a conceptual foundation based on indigenous communities (Santafe-Troncoso & Loring, 2021), two works highlight gender and community dimensions as the focus of intervention (Kassam, 2009; Patel et al., 2015), one offers participatory methodologies for nutrition governance (Guariguata et al., 2020), and one demonstrates pathways for market transformation through alternative food networks (Nigh & González Cabañas, 2015). Taken together, these five works provide a strong foundation for a research and policy agenda that integrates local knowledge, gender justice, ethical market innovation, and participatory governance for sustainable food sovereignty.

Table 1. Most cited documents

No	Title	Author & Year	Total Citation (TC)	TC per Year
1	Viewing Change Through the Prism of Indigenous Human Ecology: Findings from the Afghan and Tajik Pamirs	Kassam (2009)	70	4.12
2	The Interplay Between Household Food Security And Wellbeing Among Small-Scale Farmers In The Context Of Rapid Agrarian Change In India	Patel et al. (2015)	41	3.73
3	Indigenous Food Sovereignty And Tourism: The Chakra Route In The Amazon Region Of Ecuador	Santafe-Troncoso & Loring (2021)	38	7.60
4	Using Group Model Building to Describe the System Driving Unhealthy Eating and Identify Intervention Points: A Participatory, Stakeholder Engagement Approach in the Caribbean	Guariguata et al. (2020)	35	5.83
5	Reflexive Consumer Markets as Opportunities for New Peasant Farmers in Mexico and France: Constructing Food Sovereignty Through Alternative Food Networks	Nigh & González Cabañas (2015)	32	2.91
6	An Agriculture And Health Inter-Sectorial Research Process To Reduce Hazardous Pesticide Health Impacts Among Smallholder Farmers In The Andes	Cole et al. (2011)	28	1.87
7	"Black Folks Do Forage": Examining Wild Food Gathering In Southeast Atlanta Communities	Gaither et al. (2020)	18	3.00
8	An Offering of Grain: The Agricultural and Spiritual Cycle of a Food System in the Kailash Sacred Landscape, Darchula, Far Western Nepal	Castagnetti et al. (2021)	13	2.60

3.5 Trend topics and thematic evolution

In this section, researchers will present Biblioshiny's findings related to trending research topics and how existing themes have developed or evolved from 2009 to 2025. Table 2 shows two topics that are mainstream in research on women's participation in food sovereignty. In the topic trend analysis in Table 2, two dominant topics emerge, namely food sovereignty and food security. Food security has a frequency of 5 with a more mature time curve. The first quartile appeared in 2015, the median in 2018, and the third quartile in 2023. This pattern shows that the issue of food security has been a stable concern since the mid-2010s and has remained relevant recently. Food sovereignty has a frequency of 11 and appears as the most intensive topic in the corpus. The first quartile appeared in 2020, the median in 2021, and the third quartile in 2023. This indicator indicates a strong surge in interest after 2020, in line with the sustainability agenda, the revitalization of local knowledge, and an emphasis on food justice.

Furthermore, the thematic evolution map in Figure 4 shows the continuity of food sovereignty from the 2009–2020 period to the 2021–2025 period. Not only does this topic persist, but it also serves as a common thread that connects research conducted before and after 2020. The persistence of the topic indicates that food sovereignty serves as a conceptual framework that encompasses various derivative issues, such as seed governance, alternative food networks, and the role of indigenous communities and women. In the context of research development, these results suggest a deeper exploration of the relationship between food sovereignty and food security. Appropriate research directions can examine how food sovereignty strategies affect the resilience of households, especially in the post-2020 period when supply disruptions and climate crises are becoming increasingly apparent.

Table 2. Trend topic on women participation and food sovereignty research

Item	Frequency	Year_Q1	Year_Med	Year-Q3
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Food security	5	2015	2018	2023
Food sovereignty	11	2020	2021	2023

Methodologically, reading the time quartile signals the diffusion phase of the topic. Food security appears to be in a consolidation phase, while food sovereignty shows a phase of rapid expansion. These findings support a publication strategy that places food sovereignty as the anchor theme, while encouraging the integration of social impact and policy metrics so that the bridge between food sovereignty and food security can be empirically tested in various geographical contexts.



Fig. 4. Thematic evolution on women participation and food sovereignty research

3.6 Thematic mapping

Figure 5 shows a map of research themes in four quadrants. The theme map shows three main clusters that form the structure of the field. “Food sovereignty,” “food security,” and “alternative food networks” are in the basic themes quadrant. Their position has high centrality but low density. This means that these three themes form a conceptual foundation that often connects studies, but their methodological depth and operationalization still vary. The large bubble size indicates frequency dominance in the corpus.

In the motor themes quadrant, “gender,” “collective rights,” and “participatory action research” appear with high centrality and density. This cluster acts as a driver of development in the field because it offers a framework of justice and participatory tools that are directly linked to the food system transformation agenda. Collaboration based on participatory action research provides strong evidence for policy change, while the lens of gender and collective rights focuses attention on community agency.

The niche themes quadrant is filled with “indigenous women” and “traditional knowledge.” High density indicates mature specialization, although its connection with other themes is still limited. The potential for integration is seen when these themes are crossed with motor themes through research designs that prioritize rights, participation, and community-based welfare indicators. The emerging or declining themes quadrant contains “seed sovereignty,” which has low centrality and density. This position can be interpreted as a theme that is either growing or beginning to decline. Given the relevance of seeds to food sovereignty, strengthening bridges to basic themes and motor themes would be strategic, for example, through studies on seed rights, community seed governance, and their impact on household resilience. Overall, the map confirms that this field is supported by the triad of sovereignty, resilience, and alternative food networks, driven by the lens of gender and collective rights, and enriched by traditional knowledge and indigenous women's leadership.

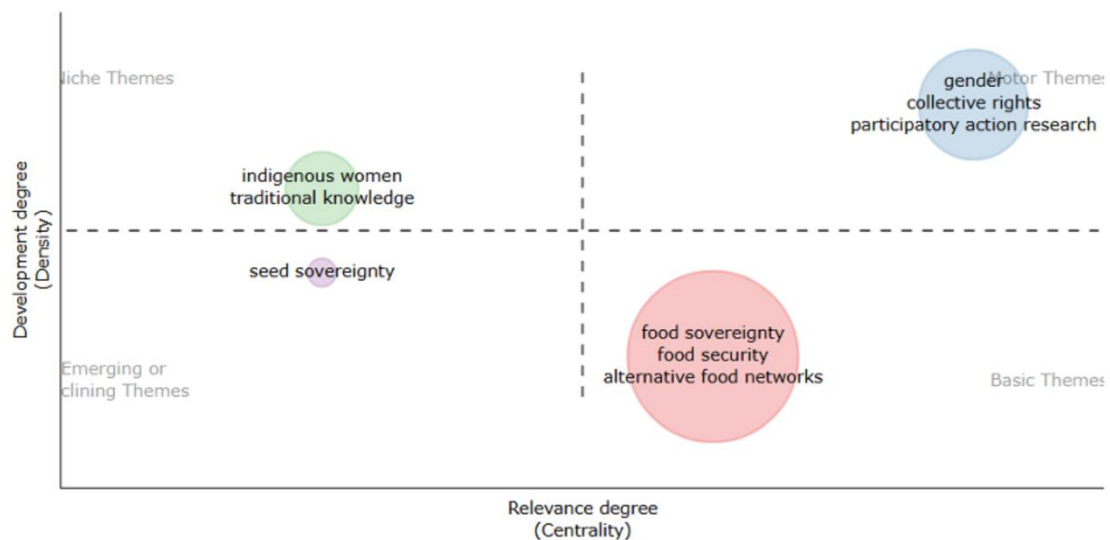


Fig. 5. Thematic mapping on women participation and food sovereignty research

3.7 Factorial analysis

Figure 6 presents a two-dimensional mapping, which explains the structure of variation with Dimension 1 at 64.1% and Dimension 2 at 19.2%. With a total of approximately 83% of the information explained, this configuration is sufficiently representative to read the polarization of themes in the corpus. Dimension 1 separates the cluster of community-based rights and institutions on the left from the cluster of seeds and specific entities on the right. Concentrated on the left are “communal land governance,” “participatory action research,” “collective rights,” and “gender.” These four form a spectrum that emphasizes collective governance, justice, and participatory methods. Around the center point are “food sovereignty” and “agricultural development,” which serve as a link between the orientation of social justice and the production agenda. On the right side is seed sovereignty, which marks a focus on seed rights and variety management practices. Chatterjee's point is far to the right, indicating thematic separation or a role as a referential marker that is not closely networked with the theme of collective justice.

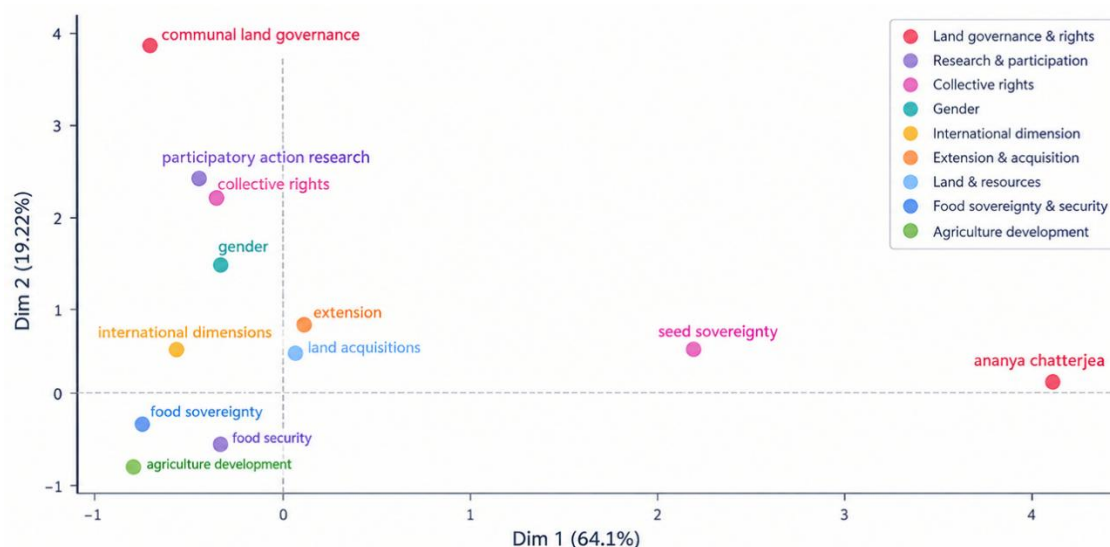


Fig. 6. Factorial analysis on women participation and food sovereignty research

Dimension 2 maps the gradation between communal governance on the positive value and production orientation on the negative value. “Communal land governance” occupies the highest position on the vertical axis, indicating the depth of relations within community

institutional clusters. At the bottom are “agricultural development” and several technical topics, such as “extensions” and “institutions,” which indicate a focus on implementation and production services. Seed sovereignty is positioned close to the vertical center line, indicating that this theme has the potential to bridge the communal institutional agenda and the production agenda. These results indicate that the findings can strengthen work that links “food sovereignty” with collective rights and “seed sovereignty” through participatory action research methodology. This path has the potential to increase interconnectivity between clusters while enriching evidence of policies relevant to food system transformation.

3.8 Repositioning women's participation in food sovereignty through the lens of reflexivity

The bibliometric findings presented in Sections 3.1 to 3.7 show a clear shift in discourse. We witness an evolution from ‘food security’ (as a mature or fundamental theme) towards the dominance of ‘food sovereignty’ (as a rapidly developing theme after 2020), as well as the strengthening of ‘motor themes’ such as ‘gender’, ‘collective rights’, and ‘participatory action research’. These findings are not merely statistical data; rather, they are empirical manifestations of a larger social process, which can be interpreted in depth through Beck(1992) frameworks of ‘risk society’ and ‘reflexive modernization’. This shift from ‘security’ to ‘sovereignty’ reflects a collective reflexivity response to the risks generated by the modern food system itself. This section of the discussion will examine how these bibliometric patterns reflect the practices of ‘subpolitics’ and reflexive modernization in women's participation.

Key findings from the thematic map and evolution show that “food sovereignty” is the main focus of discourse, while “food security” remains present as a more technocratic mainstream. Surrounding it, themes such as “gender,” “collective rights,” and “participatory action research” serve as drivers that increase the interconnectedness of fields and deepen conceptual density. Meanwhile, “indigenous women” and “traditional knowledge” emerge as niche themes that are conceptually mature but not yet strongly connected to the mainstream. “Seed sovereignty” appears to be a theme that is still on the rise, and the cluster of factors shows an aggregation of terms such as “communal land governance,” “agricultural development,” and “international institutions,” as well as outlier authors or terms that stand on the edge of the conceptual map. This pattern is consistent with a shift in discourse from mere calorie availability to autonomy, justice, and more participatory resource governance.

Based on Beck's (1992) perspective, this configuration is a sign of “reflexive modernization” when knowledge, science, and policy no longer only drive the production of wealth but are also forced to deal with the risks and side effects (Sørensen & Christiansen, 2014; Wimmer & Quandt, 2007). Beck (1992) states that modern society does not merely share prosperity but also shares the risks that arise from the modernization process itself. Jarvis (2007) states that these risks are global in nature, often invisible, and transcend class and national boundaries. Therefore, what is “essential” is no longer just growth, but how risks are defined, debated, and managed through science, media, and the politics of knowledge. In Beck's terms, this is the “politics of knowledge” of a risk society, where seemingly technical definitions are actually value-laden and have an impact on who is protected and who is exposed.

In the context of food, the prevalence of “food sovereignty” indicates the emergence of collective reflexivity. Communities are no longer merely recipients of policy or technical information but also participate in defining what constitutes safe, fair, dignified, and sustainable food (Blue Bird Jernigan et al., 2021). This conclusion is in line with Beck's (1992) thesis on the “boomerang effect,” which states that the risks generated by the modernization model will return to hit the centers of production and decision-making. Environmental crises, contamination, feed prices, or supply chain shocks act as triggers for reflexivity, forcing a shift from production indicators to more democratic and participatory governance. It is therefore not surprising that the thematic map in the research results

places “participatory action research” and “collective rights” as the driving themes. Both are institutional tools that expand the right to define risk while restoring citizens' bargaining power over science and the market.

The niche maps for “indigenous women” and “traditional knowledge” show that local epistemologies are gaining new legitimacy as sources of risk mitigation that are beyond the reach of classical technocratic approaches. Beck (1992) emphasizes that contemporary risks are often invisible to the senses and highly dependent on how science and regulation define them. In food, the long history of setting “safe limits” has often led to the normalization of residues or slow degradation. The increase in themes of local wisdom reflects a bibliometric response that corrects the limitations of purely laboratory-based definitions of risk. In other words, the literature is moving from “what works in the lab” to “what keeps communities safe in practice.”

Clusters of factors such as “communal land governance” and “international institutions” reveal a systemic risk architecture. Communal land rights determine vulnerability and adaptive capacity, while international institutions determine commodity flows, standards, and risk verification regimes. Beck (1992) argues that modern risks transcend territorial boundaries and undermine traditional sovereignty. That is why “governance” and “collective rights” have become the theoretical axes that unite the literature. On the other hand, the presence of outliers on the factor map indicates the existence of knowledge nodes that have the potential to become cross-cluster bridges as more studies confirm their relevance.

Evolutionarily, findings on research trends show a shift from “food security” to “food sovereignty” in the last decade. Within Beck's framework, this shift is a symptom that the “rational goals” of food modernization are being corrected by the “reflexive rationality” born of crisis experience. The increasing socio-ecological costs have left society dissatisfied with the promise of quantitative food security. They demand the right to determine the seeds, land, ecology, and knowledge that support the food system. Thematic mapping that places “alternative food networks” as a basic theme affirms the birth of new infrastructure that distributes risk more fairly through shortened supply chains, transparency, and more symmetrical producer-consumer relations.

Re-examining women's participation in food sovereignty through Ulrich Beck's lens places this issue at the heart of the “risk society,” a social order that generates artificial uncertainty from its own progress and demands a process of “reflexive modernization” to reassess the logic of food production that has long ignored socio-ecological impacts. In this framework, food is no longer merely a matter of increasing output but rather a matter of mitigating the risks produced by the modern food system and reorganizing the institutions and knowledge that govern production, distribution, and consumption. Beck (1992) notes that reflexive modernization encourages grassroots actors to self-evaluate existing practices and structures, while the concept of “subpolitics” explains how citizens, communities, and professional networks initiate change outside of formal political channels. This perspective explains why women's practices at the community level, such as seed management, land governance, and participatory action research, have become effective political spaces for reducing systemic risks while strengthening food autonomy.

The bibliometric findings in this analysis (Figure 5) quantitatively identify that ‘gender’, ‘collective rights’, and ‘participatory action research’ function as ‘motor themes’. Their position (high centrality and density) indicates that these three are the main drivers that propel and accelerate the evolution of this field of study. Beck's (1992) theoretical claim regarding ‘subpolitics’, namely practices of change initiated from below, outside the formal political arena, finds empirical support here. The data shows that the focus of scientific literature has shifted from top-down policies (from the state or market) to agency and participatory methodologies (from women's communities). This is clear evidence of ‘subpolitics’ practices documented in the scientific landscape, which is in line with the views of (Calvário & Desmarais, 2023). In practice, these ‘subpolitics’ are seen in... [continue with the rest of the original paragraph: “stakeholder-based research...”] In practice, subpolitics is evident in stakeholder-based research and policy designs that map out intervention

leverage points, such as the group modeling method in the Caribbean islands to unravel food systems that produce malnutrition. Guariguata et al.'s (2020) research demonstrates that cross-stakeholder engagement fosters a collective capacity to identify risks, alter the rules, and restructure the relationships between the market, the state, and the community that affect women's well-being. This is a concrete form of reflexive modernization because decisions are made by weighing the unintended consequences of the existing food system.

In the knowledge horizon, women appear not merely as beneficiaries but as producers of knowledge relevant to risk mitigation. Kassam's (2009) study of the human ecology of indigenous peoples in Pamir shows how local knowledge, subsistence practices, and spiritual relationships with the landscape form the basis for adaptation to socio-ecological change. Beck's work helps us see this knowledge as a social "sensor" that makes invisible risks visible, enabling communities to design safer responses for household food provision. The bridge to the household level is also evident in Kassam's (2009) research in India, which shows the complex interrelationship between food security, subjective well-being, and division of labor. The implication is that it is important to reorganize access to resources, workload, and decision-making authority so that food sovereignty strategies can truly reduce women's vulnerability.

The next strategic repositioning is seen in practices that combine culturally based economic diversification, agroecological preservation, and the strengthening of collective rights. Santafe-Troncoso & Loring's (2021) research on the Chakra route in the Ecuadorian Amazon demonstrates that community-based tourism can bolster indigenous food systems, enhance culinary identity, and safeguard land and seed rights. Within the framework of risk society, this strategy reduces dependence on fragile food regimes and expands the collective autonomy of women as guardians of knowledge and decision-makers. Thus, the narrative of food sovereignty that has been mapped moves from mere access to food to the ability of women and communities to govern risk through local knowledge, collective rights, and adequate participatory mechanisms. This strategy is a form of reflexive modernization that shifts the focus from the promise of progress to the fair and sustainable management of its consequences.

The results of this study show that, compared to previous studies, it has three main contributions. First, it provides bibliometric-based longitudinal evidence that food sovereignty has become a binding framework that shifts the focus from output to the distribution of risk and the right to determine food systems initiated by women. Second, it demonstrates the integration of local epistemology and participatory methods as drivers that enhance the reflective capacity of the system while also reorganizing the politics of knowledge discussed by Beck. Third, it maps new connecting paths through "seed sovereignty" that has the potential to unite communal governance with alternative production and market network agendas. Thus, this study not only captures the discourse map but also shows the institutional architecture needed to reduce risk injustice in the food sector by repositioning the role of women through initiated subpolitics.

The limitations of the study lie in the inclusion and exclusion criteria used, which may affect the small number of documents, the variation in metadata quality, and the authors' h-index, which has not been included and calculated in the study. Not only that, but the database used is only within the scope of Scopus and only uses one analysis tool, namely Biblioshiny. So if researchers use different analysis tools, such as VOSviewer and the Web of Science database, it will change the research results. Therefore, future researchers are expected to use broader inclusion and exclusion criteria and be able to combine various bibliometric tools and other credible databases. Nevertheless, the results of this study still provide a map that can be followed up and opens up space for further research on inter-country collaboration networks, the evolution of themes after 2020, and the measurement of policy impacts at the household and community levels.

4. Conclusions

This bibliometric analysis of 25 documents (2009-2025) confirms a fundamental shift in discourse in studies of women's participation. The literature has evolved from a focus on 'food security' (a mature theme that tends to be technocratic) to the dominance of 'food sovereignty' (a theme that has grown rapidly since 2020). This shift is significantly driven by crucial 'motor themes', namely 'gender', 'collective rights', and 'participatory action research'. As synthesized in the discussion (Section 3.8), these findings empirically validate Ulrich Beck's 'risk society' theory. Women's participation in food sovereignty is not merely passive participation, but rather a practice of 'subpolitics' and a manifestation of active 'reflexive modernization'. This marks a paradigm shift from a technocratic focus (calorie fulfillment) to a focus on participatory justice (collective rights, autonomy, and indigenous knowledge) in managing the risks of the modern food system.

Ultimately, this study maps out several implications. From a policy perspective, researchers see that food research and governance need to shift from merely reducing technical uncertainty to reducing risk injustice. This can be achieved by strengthening collective rights, land access, and participatory mechanisms in defining what constitutes safe and fair food. Furthermore, the integration of local knowledge and formal science is not merely a "complement" but a prerequisite for overcoming the "risk blindness" that often accompanies technocratic definitions. And importantly, because risks are transboundary, the international framework must provide space for community sovereignty without negating global coordination. This is where Beck's "community of danger" serves as the moral basis for solidarity across scales.

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