Research

Microfinance and Women: Bibliometric Analysis and Trends Using the ARIMA Model*

[English Version]

Microfinanzas y mujeres: análisis bibliográfico y tendencias con la utilización del Modelo Arima

Microfinanças e mulheres: análise bibliográfica e tendências com o uso do modelo ARIMA

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Abstract

Objective: To conduct a bibliometric analysis and trend review of research on microfinance and women. **Methodology:** The autoregressive integrated moving average (ARIMA) model was used due to its capacity to model and forecast time series data. Publication data from the Scopus database for the period 2010-2023 were analyzed to strengthen the study. **Results:** The findings allowed the identification of patterns, seasonality, and changes that revealed trends and potential research lines on the topic.

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Conclusions: Overall, microfinance is considered a positive strategy used by different countries to promote women's empowerment.

Key words: Microfinance; empowerment; women; ARIMA model; SDGs (obtained from the Social Sciences Thesaurus).

Resumen

Objetivo: realizar un análisis bibliográfico y revisión de tendencias sobre las microfinanzas y las mujeres. **Metodología:** se utilizó el modelo autorregresivo integrado de medias móviles —ARIMA—, debido a su capacidad para modelar y predecir series temporales. Se cotejaron los datos de publicaciones de la base de datos Scopus entre los años 2010 y 2023 para enriquecer la investigación. **Resultados:** los resultados permitieron identificar patrones, estacionalidades y cambios que generaron tendencias y posibles líneas de investigación en el tema. **Conclusiones:** en general, se consideran las microfinanzas como una estrategia positiva utilizada por diferentes países para el empoderamiento de las mujeres.

Palabras clave: Microfinanzas; empoderamiento; mujeres; Modelo ARIMA; ODS (obtenidos del tesauro de Ciencias Sociales).

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Resumo

Objetivo: realizar uma análise bibliográfica e revisão de tendências sobre microfinanças e mulheres. **Metodologia:** utilizou-se o modelo autorregressivo integrado de médias móveis — ARIMA — devido à sua capacidade de modelar e prever séries temporais. Os dados de publicações da base de dados Scopus entre os anos de 2010 e 2023 foram comparados para enriquecer a pesquisa. **Resultados:** os resultados permitiram identificar padrões, sazonalidades e mudanças que geraram tendências e possíveis linhas de pesquisa sobre o tema. **Conclusões:** de modo geral, as microfinanças são consideradas uma estratégia positiva utilizada por diferentes países para o empoderamento das mulheres.

Palavras chaves: Microfinanças; empoderamento; mulheres; Modelo ARIMA; ODS (obtidas do Tesauro de Ciências Sociais).

Introduction

Microfinance is associated with small loans and other financial services provided to population groups underserved by traditional banking systems. These initiatives are generally implemented through government programs established in partnership with institutions specialized in the field. In recent years, microfinance has gained increasing relevance due to the impact that empowerment approaches have had on women's decision-making processes and on personal, social (Pareek *et al.*, 2019), psychological (Samant *et al.*, 2019), and economic dimensions (Shohel *et al.*, 2021). Consequently, microfinance is considered both a poverty reduction and comprehensive development strategy grounded in a gender perspective (Al-shami *et al.*, 2021), and a mechanism that facilitates access to savings and credit services for individuals excluded from the traditional financial system because they are unable to meet formal requirements (Khan & Ansari, 2018).

As a mechanism for women's empowerment, microfinance directly contributes to the achievement of Sustainable Development Goal 1, associated with poverty reduction, and Sustainable Development Goal 5, related to gender equality (Wondimu *et al.*, 2023; Olohunlana *et al.*, 2022). From the perspective of poverty reduction, microfinance functions as a support strategy that helps reduce gender-based violence while increasing women's decision-making capacity within the household (Kapiga *et al.*, 2019). These initiatives are often complemented by support or self-help groups in which individuals join together to obtain credit while collectively sharing debt and risk through cooperation and solidarity in the development of economic and productive activities led by women entrepreneurs. Another related aspect involves the design of economic empowerment strategies aimed at vulnerable women, as well as their articulation with broader development and health policies (Tolmay *et al.*, 2022; Macrimmon *et al.*, 2018).

Additionally, several studies suggest that microfinance contributes to higher levels of income generation and participation among women, families, and microenterprises through savings practices, access to credit, and training programs aimed at strengthening entrepreneurial skills (García *et al.*, 2024; Hewa-Wellalage & Thrikawala, 2021).

Despite these contributions, the literature also reveals limitations in the implementation of such programs, operational contradictions, and insufficient evidence regarding their contextualized impacts, particularly in Latin America and the Caribbean.

This article presents a bibliometric analysis and review of trends related to microfinance and its relationship with different dimensions of women's agency, a thematic area that still requires further examination. Likewise, the study identifies

research gaps and emerging categories that may contribute to future research agendas.

The article is organized into several sections. The first presents the methodology used in the study, with particular emphasis on the ARIMA model (Autoregressive Integrated Moving Average Model). The second section focuses on the results derived from the application of the model. The third discusses the patterns and trends identified through the literature review. The fourth presents the main findings obtained from the Scopus analysis conducted to strengthen the study. Finally, the fifth section outlines the main conclusions, as well as potential directions for future research and the limitations identified in the development of this type of study.

Methodology

The methodology employed in this study was the Autoregressive Integrated Moving Average (ARIMA) model. This approach facilitates the analysis of sequential data, seasonality, behavioral changes, and the identification of patterns in the literature related to the topic, since it is widely used for modeling and forecasting time-series data (Box *et al.*, 2015). According to Pindyck and Rubinfeld (2014), this method provides representative insights into changes and the relative importance of research topics over time. Likewise, Box *et al.* (2015) argue that the usefulness of the ARIMA model in this context lies in its capacity to identify long-term trends, detect significant shifts in academic attention, and indicate potential directions for future research.

For this study, the general expression of the ARIMA model is presented as follows:

$$Y_t = C + AR(p) * Y_{t-1} + MA(q) * \varepsilon_{t-q} + \varepsilon_t$$

Where:

- Y_t is the variable of interest at time period *t*.
- C is the constant term or intercept of the model.
- AR(p) represents the autoregressive terms of order p, which capture the relationship between past values of the time series and the current value.
- Y_{t-1} is the value of the variable in the previous time period.

- MA(q) represents the moving average terms of order *q*, which capture the relationship between past forecast errors and the current value.

- ε_{t-q} is the forecast error in time period $t-q$, where q is the order of the moving average term.

- ε_t is the forecast error at time period t.

The previous equation represents the structure of an ARIMA model, in which each coefficient establishes the degree of relationship between variables and error terms. The model was subjected to the Dickey-Fuller Test, also known as the Unit Root Test, in order to determine the stationarity of the data over a specific period. According to Dickey and Fuller (1979), this test is frequently used in economics, finance, and social science research. The null hypothesis assumes that a time series contains a unit root and is therefore non-stationary, whereas the alternative hypothesis assumes that the series is stationary. Based on these assumptions, the test compares the calculated t-statistic with the critical values of the Dickey-Fuller distribution (Dickey & Fuller, 1979) to determine whether the null hypothesis can be rejected.

Likewise, Dickey and Fuller (1979) argue that the test is highly useful for detecting unit roots in economic time series, thereby helping to identify the possible trends and seasonal patterns. The test has been widely applied in economic and financial research because of its effectiveness in identifying non-stationarity in financial and economic data. In addition, it has been used in a variety of contexts and thematic areas, including stock price forecasting and trend analysis in macroeconomic data. Similarly, Kwiatkowski *et al.* (1992) recognize the Dickey-Fuller test as a useful tool for identifying the seasonality and stationarity in time-series data, thus providing a solid basis for modeling and forecasting.

To conduct the analysis and review of trends concerning "microfinance and women," publication data from the Scopus database covering the period 2010-2023 were analyzed according to two main criteria: (I) the broad coverage of this database regarding the topic and its extensive collection of journals in the fields of social sciences, development studies, and women's studies; and (II) the global consolidation of microfinance as a programmatic strategy following the 2006 Nobel Peace Prize awarded to Muhammad Yunus, founder of the Grameen Bank, for this contribution to poverty reduction (World Bank, 2015). Most publications on the subject have been concentrated since 2010, considering the timeframes associated with editorial and indexing processes.

This study considers the constructs of "women's empowerment" and the Sustainable Development Goals (SDGs), although these variables are not directly

measured within the econometric model. Instead, they are used as thematic categories in the bibliometric analysis. Therefore, the purpose of the study is not to operationalize empowerment or the SDGs, but rather to analyze the temporal behavior of scientific production related to microfinance and women. The search equation used in the study is presented below (see Table 1).

Table 1. *Search Equation.*

Search date	02-21-2024
Search period	2010-2023
Journal type	All journal types
Search fields	Title
Search terms	("microfinance" OR "microcredit" OR "micro-loans*") and ("women" OR "gender")
Results	659

Results of the Application of the ARIMA Model

The model reveals a strong dependence for future publications on previously observed data. This indicates that the model adequately captures the behavior of the time series, as shown in Table 2:

Table 2. *Application of the ARIMA Model.*

Variable	Coefficient	Standard Error	t-Statistic	Probability
Constant	0.074413	0.039473	1.885164	0.0888
AR(1)	0.932435	0.164091	5.682440	0.0002
MA(1)	- 0.000316	0.371624	- 0.228137	0.8241
SIGMASQ	0.000316	0.000165	1.912733	0.0848
R^2	0.6721145	Mean dependet var		0.071429
Adjusted R^2	0.573788	S.D. depedente var		0.032209
S.E. of regression	0.021028	Akaike info criterion		-4.516831

Variable	Coefficient	Standard Error	t-Statistic	Probability
Sum squared residuals	0.004422	Schwarz Criterion		-4.334243
Log Likelihood	35.61781	Hannan-Quinn criter.		-4.533732
F-statistic	6.833755	Durbin-Watson Stat.		2.068481
Probability (F-statistic)	0.008738			

Based on the coefficients obtained from the ARIMA model, the resulting equation is as follows

$$Y_t = 0.074413 + 0.932435 * Y_{t-1} + \varepsilon_t$$

This equation corresponds to first-order autoregressive ARIMA model, ARIMA (1,0,0), due to the inclusion of the AR(1) term and the absence of differencing and moving average components.

After estimating the model, the following results were obtained:

Constant (Intercept). This coefficient represents the expected value of the time series when the remaining variables are equal to zero. According to the results, the constant has a value of 0.074413. This suggests a positive baseline trend in the annual number of publications on microfinance and women is 0.074413 per year during the analyzed period.

AR (1). This coefficient represents the relationship between the current value of the series and its previous value. The estimated coefficient of 0.932435 indicates a strong temporal dependence, suggesting that the annual number of publications on microfinance and women is highly influenced by publications from the previous year. Specifically, the coefficient indicates that approximately 93.2% of the variability in the analyzed publications can be explained by the previous period. This finding suggests a persistent growth pattern and a stable trend in scientific production related to the topic.

MA (1). This coefficient captures the relationship between the current value of the series and previous forecast errors. Since the estimated coefficient is close to zero and its associated probability is high, the moving average component does not appear to be statistically significant.

SIGMASQ (Error Variance). This coefficient represents the variance of the error term in the time series. A relatively large variance may suggest that the model does not fully account for all fluctuations in the data.

Regarding the additional statistics, the adjusted R-squared value that the model explains approximately 67.21% of the variability in the data. Likewise, the

F-statistic and its associated probability indicate that the model is statistically significant overall.

In this sense, the results obtained from the ARIMA regression suggest that the model is suitable for analyzing the publication time series on microfinance and women (Hyndman & Athanasopoulos, 2018). The strong dependence of future publications on previous publications indicates that the model adequately captures the dynamics of the series. Furthermore, the interpretation of the coefficients suggests the continuity of research lines related to microfinance and women, based on the following considerations:

Significant temporal dependence. The significant AR(1) coefficient (0.932435) indicates a strong dependence of future publications on microfinance and women on the behavior of previous publications. This suggests the existence of a persistent pattern throughout the study period, meaning that the topic remains relevant and continues to attract academic interest.

Relevance of the topic. The dependence on previous publications suggests that the topic continues to be important within the academic community. Consequently, the probability of continued scholarly attention increases due to its social and economic relevance.

Statistically significant model. The model is statistically significant overall, as indicated by the F-statistic and its associated probability. This suggests that the model contributes meaningfully to understanding and forecasting publications trends related to microfinance and women.

Additional data required. Although the MA(1) coefficient is not statistically significant, other aspects of the model, such as temporal dependence and thematic relevance, support the continuity of research related to microfinance and women. Nevertheless, it is important to consider additional variables and external factors beyond the model itself to support more comprehensive interpretations.

According to the results obtained from the ARIMA model, continued research on microfinance and women appears justified.

To determine the stationarity of the data series, the Dickey-Fuller Test (Unit Root Test) was applied to ARIMA Model structure. The following hypotheses were considered:

H_1: The time series is stationary if the t-statistic is greater than the calculated value.

H_2: The time series contains a unit root and is therefore non-stationary if the t-statistic is less than the calculated value.

The data presented in Table 3 are as follows:

Table 3. *Dickey-Fuller Test (Unit Root Test).*

Dickey-Fuller test statistic argument	t-Statistic	Probability
	-5.28267435	0.001615
1 % level	-4.12198994	
5 % level	-3.14491970235241	
10 % level	-2.713750993686372	

As previously mentioned, the Dickey-Fuller test determines whether a time series is stationary or not. The null hypothesis assumes the presence of a unit root, meaning that the series is non-stationary. The test compares the calculated t-statistic with the critical values to determine whether the null hypothesis should be rejected.

In this case, the obtained t-statistic value is -5.28267435 and its associated probability is 0.001615. This indicates that the t-statistic is lower than all the critical values at the 1%, 5%, and 10% significance levels. Therefore, the null hypothesis of a unit root can be rejected, indicating the time series is stationary.

In summary, the results of the Dickey-Fuller test suggest that the observed relationships may reflected seasonal or short-term dynamics rather than exclusively long-term structural trends. This implies that the ARIMA model may have limitations in predicting long-term changes or identifying external factors that could influence publications trends (Hyndman & Athanasopoulos, 2018). Therefore, although the ARIMA model is useful for short-term forecasting based on historical data, it is important to consider exogenous factors that may affect the validity of long-term predictions. In this context, such factors may include:

- **Government decisions**: Changes in public policies related to Sustainable Development Goal 5, "Gender Equality: Achieve gender equality and empower all women and girls" (United Nations, 2015), which may influence support program programs and women-oriented entrepreneurship initiatives.

- **Economic events:** Fluctuations in interest rates and changes in financial markets that may affect microfinance systems and related research agendas.

- **Social and cultural developments**: Awareness campaigns, changes in social norms, and feminist movements that may increase academic interest in gender-related issues.

- **Technological advances:** The implementation of new technologies in both the financial sector and in information dissemination processes.

These factors may influence researchers' interest in the topic of microfinance and women. It is difficult to predict whether the impact would be positive or negative; thereby affecting number of publications in this field.

Regarding the dependent variable, after applying the first difference to publications series on microfinance and women, the series became stationary and free from autocorrelation. This is important because ARIMA models require stationary time series to produce more reliable forecast, as illustrated in Figure 1.

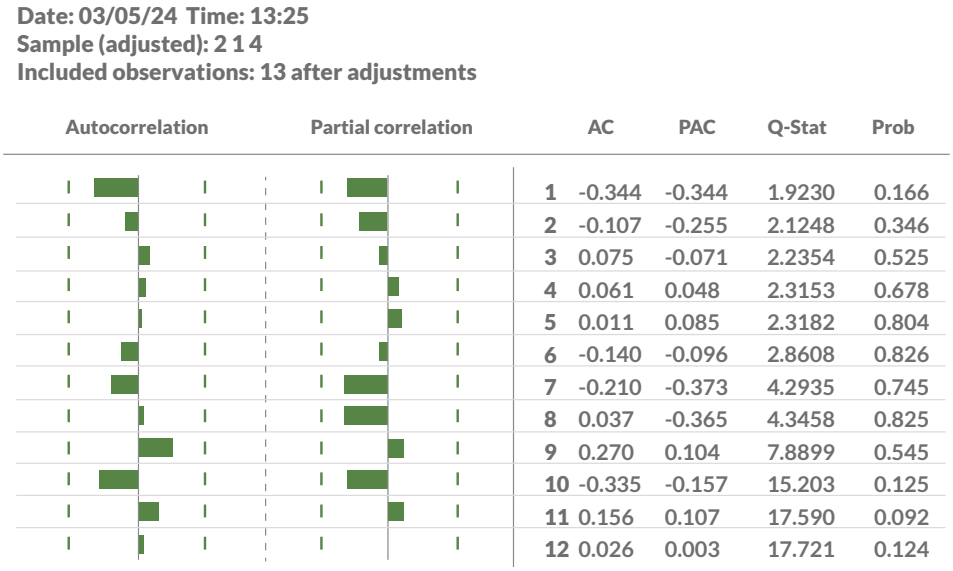

Figure 1. *Additional Supporting Evidence.*

In this sense, the absence of significant autocorrelations in the differenced time series suggest that the fitted ARIMA model adequately captures the structure of the series and that the residuals behave randomly, without systematic patterns. Consequently, the model can be considered appropriate for forecasting publication trends related to microfinance and women.

Discussion in Terms of Patterns and Trends in the Literature Review

The existence of seasonality and trends in the time series of publications on microfinance and women reveals several recurring themes and research patterns within this field during the analyzed period.

Microfinance, women, and social empowerment. Multidimensional perspectives and personal factors related to psychological structures and social leadership capacity have been widely examined (Huis *et al.*, 2017; Samant *et al.*, 2019; Baskaran *et al.*, 2022). Social empowerment implies that women participate not only in the power structures of civil society organizations, but also as active agents in decision-making processes associated with the development of economic and social activities within their communities. Women must be recognized and able to exercise influence—not merely in their roles as wives or mothers, but as individuals entitled to equal rights, conditions, and opportunities. This continues to represent a challenge for institutions that, in some cases, remain restrictive or exclusionary (Maîtrot, 2021).

Microfinance, women, and self-help groups. From the perspective of microfinance, support or self-help groups refer to associations formed by several individuals with the purpose of obtaining loans collectively. Debt and financial risk are shared among participants, enabling cooperation in the development of economic and productive activities. In rural India, these groups are often recognized as mutual aid societies; in Kenya, as community-based insurance schemes; and in Colombia, as solidarity circles. Self-help groups are also expressed through different cooperative structures, which have become important mechanisms for promoting microfinance and women's empowerment (Knight *et al.*, 2019; Alzate & Alzate, 2023). This research trend has addressed issues related to political participation, autonomy, trust, respect, education, economic benefits, collective action, and improvements in physical and mental health practices (Kumar, 2020; Walia *et al.*, 2020; Bott *et al.*, 2022). These dimensions are considered essential for strengthening egalitarian and democratic societies (Mohamed & Elgammal, 2022).

Microfinance, women, and economic empowerment. This dimension refers to household management and the administration of microenterprises or family businesses initiated through microfinance programs. In this regard, particular attention has been given to indicators related to access to economic resources (Shohel *et al.*, 2021). Economic empowerment provides women with greater autonomy, practical capacity, and influence over their personal lives, households, organizations, and communities. Consequently, it facilitates the development of leadership skills and decision-making capacity (Al-shami *et al.*, 2021).

Microfinance, women, and power relations. Through this dimension of empowerment, the effectiveness of microfinance programs has been assessed using variables associated with the programs themselves. Particular attention has been paid to initiatives led by women serving on the boards of civil society organizations (Fall *et al.*, 2021; Garikipati *et al.*, 2017). At the same time, the literature highlights situations of subordination in which women feel pressured by the need to maintain good reputations and satisfactory repayment records within lending programs (Tchakoute, 2023).

Microfinance: impact assessment of women's empowerment initiatives. Considering microfinance as an effective strategy for promoting women's development across multiple dimensions, the stationarity identified in the time series also reveals a growing body of studies focused on evaluating the effectiveness of microfinance programs. Several publications, including books and case-study compilations, document testimonies that validate the positive transformations experienced by individuals, families, and communities benefiting from these initiatives. However, despite the expectations surrounding such programs, the outcomes are not always entirely favorable. The literature also documents limitations, contradictions, and cases in which the expected impacts have not been fully achieved (Al-shami *et al.*, 2021; Huis *et al.*, 2019).

Scopus Analysis

Consistent with the results obtained from the ARIMA model, the analyzed time period reveals a growing interest in the topic within the scientific community, where several noteworthy patterns emerge. The number of publications increased from 11 documents in 2010 to 88 documents in 2023. The most significant growth in scientific production on microfinance and women occurred during the last four years of the analyzed period, as shown in Figure 2. Publications increased from 53 articles in 2019 to 88 articles in 2023, with annual growth rates of 39.47%, 32.08%, 33.33%, and 10%, respectively. These findings are consistent with the observations reported by Wondimu *et al.* (2023) and Pervin *et al.* (2023).

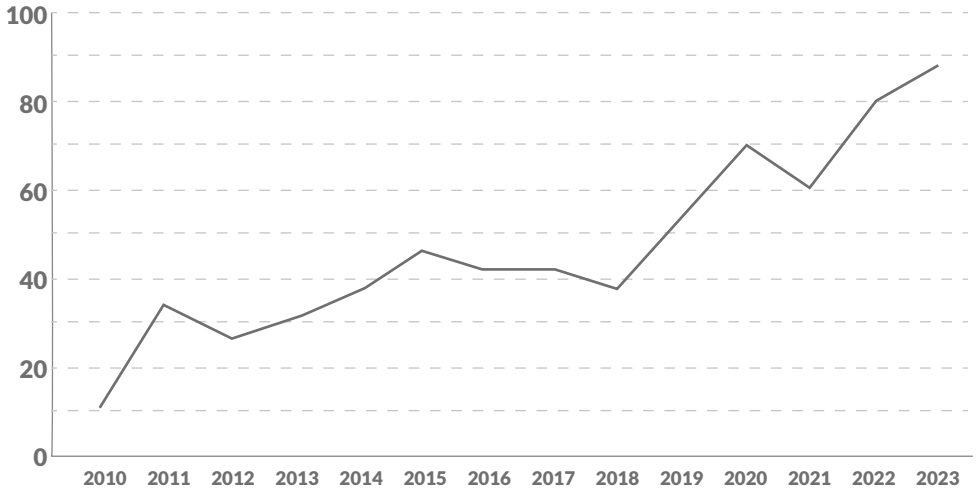

Figure 2. *Annual Publication Trends on Microfinance and Women, 2010–2023.*

Regarding scientific production by country, India leads global research output on the topic, accounting for 23.37% of total publications, followed by the United States with 19.42%, the United Kingdom with 14.11%, China with 7.59%, Malaysia with 6.53%, Nigeria with 5.31%, Australia with 5.01%, Canada with 4.1%, Pakistan with 3.95%, France with 3.49%, and South Africa with 3.49%. Regarding Latin America, only Mexico was identified with 1.37% and Colombia with 0.61%. The remaining countries collectively accounted for 1.67% of total production. These results demonstrate that women's inclusion through microfinance programs has become an increasingly relevant global research trend, encompassing both developing and highly developed countries (Gyapong *et al.*, 2021).

The ten most relevant journals on the topic are *Journal of Development Studies* (seven publications, Q1), *AIDS and Behavior* (four publications, Q1), *Development in Practice* (four publications, Q2), *Journal of Advanced Research in Dynamical and Control Systems* (four publications, Q4), *Enterprise Development and Microfinance* (four publications, Q4), *Journal of Interpersonal Violence* (four publications, Q1), *Annals of Public and Cooperative Economics* (three publications, Q2), *Gender in Management* (three publications, Q1), *Global Public Health* (three publications, Q1), and *International Journal of Entrepreneurship and Small Business* (three publications, Q3). Although the primary selection criteria were the number of publications and journal quartile rankings, additional indicators such as citation count (H-index) and journal prestige measured through the SCImago Journal Rank (SJR) were also considered.

All these journals are published in English, are highly indexed, and are committed to disseminating knowledge in the social sciences, particularly in areas related to development, health, and gender issues. The articles published in these journals are characterized by empirical approaches and by the adoption of progressive theoretical perspectives. It is noteworthy that journals from developing countries —especially from Latin America— were not represented within this group. This finding highlights not only the predominance of English-language publications, but also the tendency of researchers to prioritize prestigious journals from developed countries, despite the fact that microfinance programs are more commonly associated with developing countries and progressive public policies.

When analyzing the academic community with the highest number of publications on microfinance and women, the selection criterion included authors with between five and ten Scopus-indexed publications on the topic, under the assumption that publishing at least five documents demonstrates a solid research trajectory and expertise in the field. The leading authors identified were Nurulizwa Abdul Rashid and Chamhuri Bin Siwar, each with ten publications. They were followed by Ferdoushi Ahmed, Izaidin Bin Abdul Majid, and Nadine Shaanta Murshid, each with eight publications. Next were Nabila El-Bassel and Nor Aini Hj Idris, with seven publications each, followed by Susan S. Witte with six Scopus-indexed documents. Finally, eight authors were identified with five publications each: Michael Adusei, Samer Ali AL-shami, Tara McCrimmon, Gaukhar Mergenova, Md Aslam Mia, Sholpan Primbetova, Assel Terlikbayeva, and Charlotte Watts. The remaining authors among the 649 analyzed had between one and four publications.

A common characteristic among these authors is their predominantly positive approach toward women's empowerment through microfinance programs, examined from family, community, economic, and social perspectives. Several studies associate empowerment processes with women's leadership capacity. In line with the findings related to journals, no Latin American authors meeting the established publication threshold were identified within this group. Although researchers from the region are working on the topic, their academic trajectory in this field remains relatively limited.

Finally, it is important to note that, in addition to the terms "microfinance" and "women," the most frequently used keywords were "economic empowerment," "financial inclusion," and "rural development." Overall, the findings obtained from Scopus confirm a consistent pattern over time: the sustained relevance of the topic and the continuing interest of the international academic community.

Conclusions

The literature reviewed suggests that microfinance constitutes an important tool in the global effort to promote gender equality. These programs address not only economic issues affecting women and their families but also contribute to fostering greater levels of economic and financial development. As women increase their participation in microfinance initiatives, significant changes in their social conditions and decision-making capacities become evident.

Access to financial services provides women with opportunities to achieve greater economic autonomy, thereby strengthening their roles within both the family and the community. This empowerment is reflected in their capacity to make financial decisions and improve their well-being in a responsible and sustainable manner.

Despite these positive contributions, more comprehensive interventions are still required to ensure that such programs generate impacts within safer and more supportive environments, while also promoting women's empowerment across economic, family, and social dimensions.

Furthermore, according to the results obtained effectiveness strategies from the ARIMA model, continued research on microfinance and women appears justified. This is supported by the persistent publication pattern observed throughout the study period and by the strong dependence on previous publications identified in the time-series analysis. In other words, the topic continues to attract growing attention within the scientific community, particularly in developed countries. Consequently, it is likely that researchers will continue exploring this field because of its social relevance and academic significance.

In addition, the findings of this study contribute to understanding the evolution of academic discussions surrounding microfinance and women by combining bibliometric analysis with time-series analysis through the ARIMA model. The application of this methodological approach makes it possible to identify patterns and potential future research directions on the topic. In this regard, the results highlight the importance of continuing to investigate the relationship between financial inclusion and women's empowerment through contextualized and comparative approaches, particularly in regions where academic production remains limited. Strengthening empirical evidence under these conditions may contribute to the design of more effective public policies and financial programs aimed at promoting gender equality and sustainable development.

Possible Topics for Future Research

The results of the time-series analysis reveal emerging lines of inquiry within this field, highlighting the potential for future studies on microfinance and women, particularly in relation to women's empowerment. Such studies could provide valuable empirical evidence to support the design of more effective policies and programs aimed at promoting financial inclusion and women's empowerment worldwide. The following research topics are suggested:

Effectiveness of microfinance initiatives from a gender perspective. Future studies could examine how women's financial experiences and needs shape the field of microfinance, as well as the effects of designing more inclusive and equitable financial policies, as suggested by Aktaruzzaman and Farooq (2023) and Cruz *et al.* (2022). Similarly, research could analyze the effectiveness of microfinance initiatives specifically targeted at women and their relationship with economic empowerment, considering variables such as business creation, access to financial services, and increases in household income (Adusei *et al.*, 2017; Dhungana *et al.*, 2023).

Gender gap in access to financial services. Given that unequal access to financial services remains one of the main challenges affecting the operation of microfinance programs, future research could analyze the barriers women face in accessing financial services and how these limitations reduce their participation in economic activities. Likewise, estudies could evaluate the effectiveness of strategies designed to overcome such barriers (Hewa-Wellalage & Thrikawala, 2021; Shohel *et al.*, 2023).

Impact of public microfinance policies on women's empowerment. Further research could assess the impact of public policies aimed at promoting women's economic empowerment, including financial education programs, support initiatives for women entrepreneurs, and tax incentives for financial institutions that provide services to women, among other measures (Uzma *et al.*, 2018).

Gender perspectives in the design of financial products. Another relevant line of inquiry involves comparing the financial needs and preferences of women and men in order to identify differences that may contribute to the design of more inclusive and gender-sensitive financial products (Rodrígues-Salgado & de Farias-Aires, 2018; Gupta & Gupta, 2014).

Comparative analyses of microfinance and women's programs across local, regional, national, or international contexts. Comparative studies at local, regional, national, and international levels could examine the socioeconomic impact of microfinance programs to identify best practices applicable across different contexts with similar characteristics. Such analyses could be

conducted using indicators associated with Sustainable Development Goals 1, 5, and 8.

Analysis involving self-help groups in low-income countries. Future research could also focus on self-help groups in low-income countries and their contribution to women's development within their communities. These groups often generate positive effects on economic and productive development while helping to address family, community, and social problems. In many cases, they provide urgent assistance for essential needs, thereby preventing community members from resorting to illegal or informal lending systems (Samant *et al.*, 2019).

Finally, it is important to acknowledge several factors that may hinder the achievement of research objectives in this field: (I) limited access to detailed and comprehensive information regarding microfinance program experiences, particularly in countries with less developed financial information systems; (II) difficulties in ensuring women's participation as research subjects due to cultural constraints and contextual factors; (III) family responsibilities and women's limited access to education and better employment opportunities across different contexts; (IV) challenges associated with evaluating the long-term impact of microfinance and women's empowerment programs because of the lack of monitoring processes and changing economic and political environments; and (V) the presence of sampling bias in some studies, especially when samples are restricted to women already participating in microfinance programs, which may limit the generalizability of the findings.

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