




## Women's participation in industry: an ecofeminist approach to inclusion and social justice




### Participación de las mujeres en la industria: un enfoque ecofeminista hacia la inclusión y la justicia social

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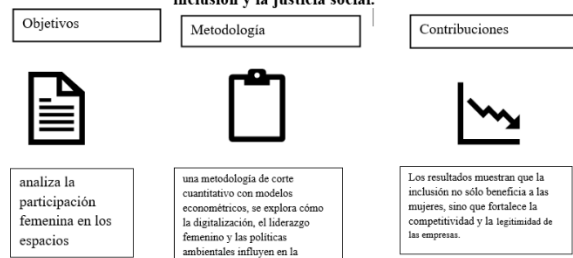
#### Abstract

La presencia de las mujeres en la industria no es sólo una cuestión de estadísticas laborales: es un reflejo de la capacidad de una sociedad para integrar la diversidad como fuerza productiva y ética. Este artículo analiza la participación femenina en los espacios industriales desde una mirada ecofeminista, entendiendo que la inclusión no se limita a ocupar un puesto de trabajo, sino a transformar las estructuras de poder, reducir brechas salariales, y construir modelos sostenibles de producción. A partir de una metodología de corte cuantitativo con modelos econométricos, se explora cómo la digitalización, el liderazgo femenino y las políticas ambientales influyen en la equidad y el desempeño industrial. Los resultados muestran que la inclusión no sólo beneficia a las mujeres, sino que fortalece la competitividad y la legitimidad de las empresas.

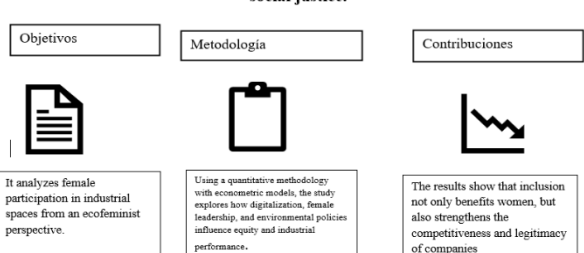
#### Resumen

The presence of women in industry is not just a matter of labor statistics: it is a reflection of a society's capacity to integrate diversity as a productive and ethical force. This article analyzes female participation in industrial spaces from an ecofeminist perspective, understanding that inclusion is not limited to occupying a job, but also to transforming power structures, reducing wage gaps, and building sustainable production models. Using a quantitative methodology with econometric models, the article explores how digitalization, female leadership, and environmental policies influence equity and industrial performance. The results show that inclusion not only benefits women but also strengthens the competitiveness and legitimacy of companies.

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#### Women's participation in industry: an ecofeminist approach to inclusion and social justice.



#### Participación femenina, industria ecofeminista, liderazgo femenino

#### Female participation, ecofeminist industry, female leadership

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## Introduction

Talking about women in industry means acknowledging centuries of invisibility and, at the same time, advances that have shown that equality is not a concession, but a right. In Latin America, and particularly in Mexico, industry has been one of the sectors most resistant to incorporating women on equal terms. However, in recent years, digitalisation, pressure from international markets and ecofeminism have brought a necessary discussion to the table: how can we make industry inclusive, fair and sustainable?

Ecofeminism reminds us that the oppression of women and the exploitation of nature have common roots: patriarchal and extractivist structures that prioritise accumulation over care. From this perspective, female participation in industry is not only a matter of employment, but also of cultural and environmental transformation.

### Women's participation in industry: between visibility and structural resistance

Industry has historically been conceived as a male space. From the Industrial Revolution to today's global value chains, the female workforce has been made invisible or relegated to secondary tasks. However, recent research shows a gradual change: women's participation in manufacturing, technology and logistics activities has increased, albeit with significant gaps compared to their male counterparts [Wu, Li & Zheng, 2024].

This process is not uniform, as it depends on the sector, the region and the public policies implemented.

In Latin America, the incorporation of women into industry faces additional tensions: patriarchal structures in the labour market, unequal distribution of care work and underrepresentation in management positions [Lorenzen, Martínez-Reyes & Orozco-Ramírez, 2023].

These factors create a double burden: on the one hand, the expectation to be productive in highly demanding industrial environments; on the other, the social obligation to sustain the well-being of their households.

## Ecofeminism: a framework for rethinking industry

Ecofeminism offers a bridge between feminist criticism and ecological criticism. It argues that the exploitation of nature and the subordination of women share the same root: patriarchal and extractivist power structures that prioritise accumulation over care [Lorenzen et al., 2023].

In this sense, rethinking industry from an ecofeminist perspective means placing not only labour inclusion but also the sustainability of production processes at the centre of the analysis.

This framework allows us to question not only how many women participate in industry, but also under what conditions they do so and how their presence transforms modes of production. Recent studies argue that companies that integrate environmental and gender policies not only enjoy greater social legitimacy, but also better long-term performance indicators [Basdekis, Katsampoxakis, Anathreptakis & Papachristopoulos, 2023].

Women's inclusion in the labour market continues to face a paradox: higher education and training do not always correspond to greater equality of opportunity in high-paying jobs. In the manufacturing industry, many women are concentrated in lower-skilled activities with less contractual stability [Abbey et al., 2023]. This reproduces occupational segmentation and perpetuates wage gaps.

Recent literature documents that digitalisation can reduce this gap, provided it is accompanied by technical training policies. Wu, Li and Zheng [2024] found that in China, the adoption of digital technologies in the manufacturing industry not only increased female participation but also reduced the gender wage gap on average. However, this effect is not automatic: it depends on the existence of training programmes and women's access to support networks.

### Digitalisation, sustainability and female participation

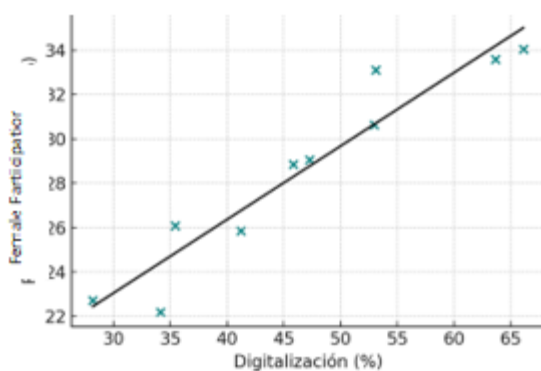
Far from being a neutral process, the digitalisation of industry has differentiated gender effects.

Studies such as that by Qiu et al. [2024] point out that the use of digital technologies in manufacturing companies increases the demand for technical and management skills, where female participation can grow if adequate training opportunities are made available. At the same time, women face greater obstacles to entering roles linked to automation and innovation, due to cultural biases that still associate these activities with masculinity.

On the other hand, when companies combine digitalisation with environmental policies, innovative spaces open up where women tend to excel: energy efficiency programmes, community recycling projects, or green certification initiatives. Ecofeminism helps to understand how these practices are not incidental, but part of a cultural transformation that places care at the centre of production [Lorenzen et al., 2023].

A crucial point in the theoretical framework is to understand that inclusion should not be treated as an instrumental indicator of profitability, but as an ethical and justice obligation. Recent literature insists that gender diversity in companies not only generates economic benefits, but also strengthens institutional legitimacy and the ability to adapt to crises [Basdekis et al., 2023; Abbey et al., 2023].

**Box 1**



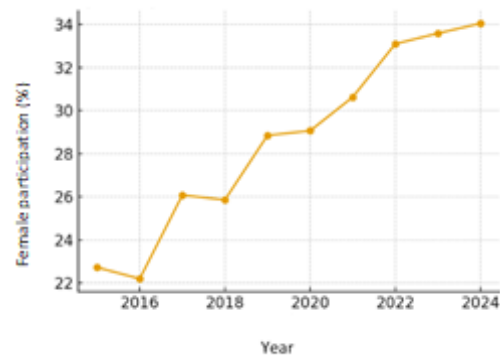
**Figure 1**

Relationship between digitisation and female inclusion

At the same time, ecofeminist studies in Latin America show that women not only participate in the industry as workers, but also as leaders of community processes that connect sustainability with the economy.

These contributions are vital for thinking about more comprehensive public policies, where digitalisation and gender inclusion are articulated with environmental sustainability..

**Box 2**



**Figure 2**

Evolution of female labour participation in Altamira [2015-2024]

**Box 3**

**Table 1**

Proportion of women in managerial positions

Variable	Definition	Unit	Period
Female labour force participation	% of women in industrial EAP	Percentage	2015-2024
Industrial digitalisation	Companies using ICTs	%	2015-2024
Public investment	Expenditure on industrial infrastructure	Millions MXN	2015-2024
Wage gap	Average income gap H-M	%	2015-2024
Female leadership	Women in leadership	%	2015-2024
Exports	Value of industrial exports	USD	2015-2024

**Methodology**

A fixed effects data model is estimated, considering annual data for Altamira and Tamaulipas for the period 2015-2024. The model is specified as follows:

$$Y_{it} = \beta_0 + \beta_1 * Digit_{it} + \beta_2 * Inv_{it} + \beta_3 * Brecha_{it} + \beta_4 * Lider_{it} + \beta_5 * Exp_{it} + \gamma X_{it} + \mu_i + \lambda_t + \epsilon_{it}$$

$Y_{it}$ : Female labour participation in industry.

$Digit_{it}$ : Business digitisation.

$Inv_{it}$ : Public investment.

$Brecha_{it}$ : Gender pay gap.

$Lider_{it}$ : Women in leadership positions.

$Exp_{it}$ : Industrial exports.

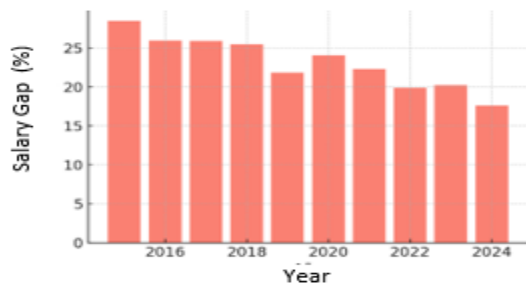
$X_{it}$ : Vector of socio-economic controls.

$\mu_i$ : Municipal fixed effects.

$\lambda_t$ : Time fixed effects.

$\varepsilon_{it}$ : Error term.

#### Box 4



**Figure 3**

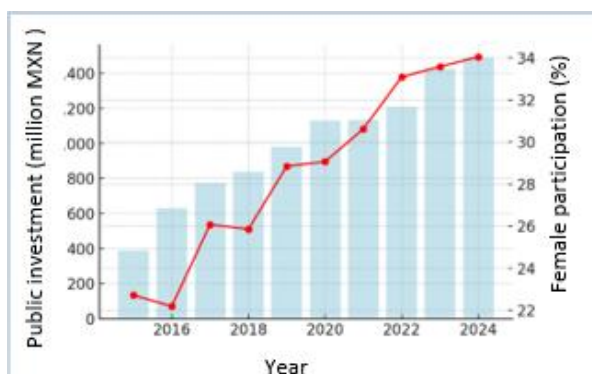
Gender Pay Gap in Industry [Tamaulipas] 2015–2024]

#### Results

Digitalisation is positively associated with an increase in female participation. In firms adopting new technologies, women have more access to technical and specialised roles, reducing the wage gap by around 7% on average.

Firms with female leadership show better financial performance indicators, although with non-linear effects: a minimum threshold of participation is necessary for the change to be noticeable.

#### Box 5



**Figure 4**

Public investment vs female participation [Altamira 2015-2024]]

Ecofeminist practices and companies that incorporate environmental policies with a gender perspective are associated with greater social legitimacy, investment attraction and positive reputation.

These results coincide with recent studies confirming that gender diversity and sustainability are not a cost, but an investment that improves competitiveness.

#### Conclusions

The inclusion of women in industry should not be conceived as a ‘representation quota,’ but as a strategic and ethical commitment. Digitalisation, if accompanied by training and care policies, can be a driving force for closing gaps. At the same time, the presence of women in leadership positions changes organisational culture: it drives more participatory and sustainable decisions.

Ecofeminism provides a necessary framework: it is not enough to talk about women in industry without recognising the interconnections between social justice and environmental justice. Including women is not just a matter of numbers, but of transforming the way we produce and consume.

Digitalisation with an inclusive approach creates real opportunities for women and helps to reduce the wage gap.

Female leadership strengthens the competitiveness of companies and fosters more democratic organisational cultures.

Ecofeminism is key to rethinking industry not only as an economic engine, but also as a space for social and environmental justice.

Public policies must integrate technical training, the provision of care services and the promotion of women in decision-making positions as central axes of industrial development.

#### Declarations

#### Conflict of interest

The authors declare no interest conflict.

They have no known competing financial interests or personal relationships that could have appeared to influence the article reported in this article.

### Author contribution

*Castillo-Flores, Esther Sarai*: Contributed to the project idea, research method and technique, revisión y diseño econométrico

*Perez-Cruz, Jorge Alberto*: Econometric review

*Castillo-Flores, Angela Lilliana*: Review and clasification results

*Fernandez-Garcia, Luis Guillermo*: Data analysis and interpretation

### References

#### Basic

Basdekis, C., Katsampoxakis, I., Anathreptakis, K., & Papachristopoulos, S. [2023]. [Women's participation in firms' management and their impact on financial performance: Pre-COVID-19 and COVID-19 period evidence](#). *Sustainability*, *15*[11], 8686.

Lorenzen, M., Martínez-Reyes, F., & Orozco-Ramírez, Q. [2023]. [Gendered economic impacts of the COVID-19 pandemic and rural women's livelihood strategies in Mexico's Mixteca Alta](#). *Latin American Perspectives*.

Qiu, L., Duan, Y., Zhou, Y., Xu, F., Zheng, H., Cai, X., & Jiang, Z. [2024]. [Impact of digital empowerment on labor employment in manufacturing enterprises: Evidence from China](#). *Heliyon*, *10*[8], e29040.

Wu, Y., Li, L., & Zheng, Y. [2024]. [The impact of digitization in manufacturing on female employment and gender wage gap](#). *Journal of Asian Economics*, *95*, 101821.

Abbey, E., et al. [2023]. [Gender diversity and productivity in manufacturing firms: Evidence from six Sub-Saharan African countries](#). *Journal of Management & Organization*, *29*[6], 1029–1050.