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The Gender Structure of Owners and the Innovative Activity of Enterprises

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Abstract:

Purpose: *The impact of gender on enterprise innovation is a relatively new yet broad research topic. Existing literature often explores the gender composition of management, employees, or RandD teams, but the influence of owners' gender structure on product and process innovations remains underexplored. In this context, the aim of the article is to determine the impact of the gender structure of enterprise owners, in different size classes, on the implementation of product and process innovations.*
Design/methodology/approach: *This study applies univariate probit modeling, selected due to the binary nature of the dependent variable. The dataset covers enterprises located in Southern Europe, from Spain and Portugal, through Italy and Greece to Türkiye.*
Findings: *The results confirm that female ownership positively affects both product and process innovation. The most favorable ownership structure is mixed-gender rather than exclusively male- or female-owned. For product innovation, firms with female-majority ownership were found to be more innovative than those primarily owned by men, while no such relationship was confirmed for process innovation. Moreover, as company size increases, changes in ownership gender composition positively influence product innovation.*
Practical implications: *Practical implications include: a) Supporting women's entrepreneurship, as female-majority micro and small firms are more likely to implement product innovations; b) Stimulating firm growth, since larger enterprises display higher innovation potential; c) Fostering women's competence development and reducing promotion barriers to management positions; d) Recognizing ownership gender structure as a relevant factor for investors and business support institutions in innovation assessment.*
Originality value: *The relationship between enterprise size and the link between ownership gender structure and innovation has never been discussed in the literature, making this study a potentially original contribution to the field.*

Keywords: *Gender, product innovation, process innovation.*

JEL codes: *J16, O30, O31.*

Paper type: *Research article.*

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1. Introduction

A study of the literature on the role of women in businesses and the economy reveals an evolving approach to this issue. The first publications on this topic began to appear in the late 1970s and early 1980s (Kanter, 1977; Cooper and Davidson, 1982; Davidson and Cooper, 1983). They highlighted inequalities in the labor market, such as women receiving lower wages compared to men in the same positions.

Furthermore, these publications described problems faced by women in managerial positions, such as: the dominance of men in middle and senior management positions and the exclusion of women from this group, stereotypes prevailing in society limiting women's role to housework, limited access to training necessary for career advancement, and the need to combine work responsibilities with housework and childrearing (Eurostat, 1981).

The professional problems faced by women in the 1980s led them to increasingly establish and manage their own businesses. Consequently, in the 1990s, scholarly publications on female entrepreneurship began to appear (Scase and Goffee, 1990, pp. 107-125; Loscocco, Robinson, 1991, pp. 511-532; Brush, 1992, pp. 5-30; Shrader, Blackburn, Iles, 1997, pp. 355-372). Articles from this period addressed, among other issues, limited access to material and immaterial resources by women-led companies.

After the year 2000, the topic of female entrepreneurship continued to be explored in the literature (Rodríguez, Fuentes and Rodríguez 2014, pp. 541-554) and encompassed an increasingly diverse range of topics.

However, the mainstream of publications focused on entrepreneurship, the effectiveness and competitiveness of women-owned businesses, and the factors influencing them. One factor that improves the effectiveness and competitive position of any enterprise is its innovative activity.

The determinants influencing innovation activity have been relatively widely discussed in the literature. However, gender as a determinant of this activity is a relatively new research area, compared to other, more traditional determinants. The first publications that began to recognize the role of women in driving innovation appeared only in the first decade of the 21st century.

Blake and Hanson pointed out that, until then, research on innovation had been overly male-biased (2005, pp. 681-701). As recently as 2016, Belghiti-Mahut, Lafont and Yousfi (2016, pp. 159-177) wrote that research in this field only considered innovations implemented by men.

Stereotypes regarding the opinion that women-owned businesses are less innovative compared to men-owned businesses were still maintained in 2018 in the work of Reutzel, Collins and Belsito (2018, pp. 430-450).

In 2020, Ibáñez, Guerrero and Mahto (2020, pp. 111-117) argued that small and medium-sized enterprises led by women who choose to innovate or collaborate are unable to absorb the economic benefits of implementing these innovations. They argued that women entrepreneurs have limited social networks, operate in a female-dominated business environment, and operate in sectors with low innovation.

Furthermore, they argued that women in managerial positions are not willing to take high risks. In Zuraik, Kelly and Perkins (2020, pp. 1475-1495), the authors found that female leaders of teams working on new solutions were less engaged in initiating behaviors such as ideation, risk-taking, and exploration compared to male leaders. Consequently, female team leaders were perceived as less effective in implementing innovations compared to male leaders.

In turn, the lack of influence of entrepreneurs' gender on innovative activity was written in the works of, among others, Nählinder, Tillmar and Wigren (2015, pp. 66-86) and Tyrowicz, Terjesen and Mazurek (2020, pp. 634-645).

The publications mentioned above, which deny the role of women in the innovation activities of enterprises, encourage intensified efforts in this area, which numerous authors have been doing for several years. However, there are still research areas that have not yet been addressed in previous studies.

One such area, which will be discussed in this publication, is the impact of the gender structure of owners on product and process innovation in enterprises of various sizes.

To date, no publications have been released that analyze whether company size influences the optimal gender structure of owners in terms of the likelihood of occurrence of product and process innovation.

This article consists of five parts: introduction, literature review, methodological section, results, and conclusions. Additionally, the literature review is divided into two parts. The first presents a literature review covering the broadly understood impact of gender on enterprise innovation activity, while the second focuses solely on the impact of the gender structure of enterprise owners on innovation activity.

This review resulted in the formulation of research hypotheses. The section describing the methodological aspects of the research includes information on 1) the source of empirical data and their structure, 2) the dependent and independent variables adopted for the study, and 3) the research method used.

The next section presents the results of the research conducted. In the final section, the obtained results are compared with the findings from other authors' publications, and on this basis, conclusions are drawn regarding the relationship between the gender structure of owners implementing and product and process innovation in enterprises.

2. Literature Review

2.1 The Influence of Gender on Innovation Activity

Most researchers who have addressed the impact of gender on innovation activity have indi-cated that women generally have a positive impact on the innovation activity of enterprises, regardless of their role. Some even argue that women are the driving force behind economic growth and innovation, especially in developing countries. In developed countries, their role is somewhat smaller (Alkharafi, 2024).

Women in enterprises can assume various roles: from owners, through senior or junior man-agement, to entry-level staff. They can also be members of RandD teams. Each of these roles impacts the innovation activity of enterprises differently. Women's influence on innovation activity also differs between family and non-family enterprises, as discussed by Hernández -Lara and Gonzales- Bustos (2020, pp. 36-51).

An attempt to challenge the stereotypes associated with the belief that men are more innova-tive than women and that male-dominated professions are more innovative than female-dominated professions was included in the work of Nählinder (2010, pp. 13-29). This study showed that female nurses were more creative in terms of innovation than their male coun-terparts in the public healthcare sector. At the same time, this study emphasized that wom-en's innovativeness is hindered by low self-confidence and the prioritized role of household and family responsibilities in relation to professional work.

Difficulties in career develop-ment for women employed in science parks were pointed out in the work by Vehviläinen, Vuolanto, and Ylijoki (2010, pp. 64-74). They emphasized that work in such business envi-ronment institutions is, on the one hand, knowledge-oriented, and, on the other hand, ser-vice-oriented and caring towards clients of such institutions.

Research conducted by Turner (2009, pp. 123-134) showed that the effectiveness of RandD teams would increase if their gender structure were more balanced. This is because women positively influence cooperation in the field of innovation between science and business, especially in high-technology sectors (Rezaei, Martin, and Kamali 2024). Moreover, women are also helpful in positions pertaining to risk management (Liu Jinzhi and Zhu Songhua, 2024).

Unfortunately, previous research has shown that women were overrepresented in areas that served only administrative and support roles. Busolt and Kugele (2009, pp. 109-122) pointed out that women are underrepresented in the world of scientific research conducted in the EU. This resulted in a low percentage of patents obtained by female researchers compared to those obtained by male researchers.

In another study, Jun, Jamil, Mughal *et al.* (2020) demonstrated that an increase in the number of employed women in each economy positive-ly influenced the number of patents and trademarks. Furthermore, these authors demonstrat-ed that an increase in the number of employed women influenced the number of innovations implemented in enterprises.

Özmutaf, Aktekin, Ergani and Çıta (2015, pp. 220-229), Coleman (2007, pp. 303-319), and Pecis (2016, pp. 2117-2140) identified the competencies of female managers that contribute to achieving success in the enterprises they manage.

They found that traits such as: dedica-tion to career development, recognition of opportunities, courage and openness to learning, agreeableness and the ability to persuade, predictability and creativity, problem-solving ori-entation and openness to novelty, commitment to cooperation, excellent communication skills, emotional approach, abstract thinking, a high sense of self-confidence, and the ability to navigate various situations influence women's ability to implement innovations, which translates into higher financial results.

The impact of top management gender on product and process innovation was addressed by Ruiz-Jiménez and Fuentes-Fuentes (2016, pp. 107-121), Davis, Babakus, Englis and Pett (2010, pp. 475-496), and Nadeem, Bahadar, Gull, and Iqbal (2020, pp. 3146-3161). They found that a more balanced gender structure in top man-agement positively impacts product and process innovation.

The impact of women's board representation on companies' innovation activity was also studied by Chen, Leung and Evans (2018, pp. 236-254). They demonstrated that women's board representation increases the chances of implementing innovations, which in turn im-pacts the financial performance of companies in innovation-intensive sectors.

Companies with women directors tended to invest more in innovation and obtain more patents. These authors found that a 10% increase in women's board representation translates into a 6% in-crease in patents. Cheng and Groysberg (2020, pp. 1-8) described their research results in a similar vein.

The problems faced by women in management positions in family businesses were high-lighted in their research by Bannò, Coller and D'Allura (2021, pp. 59-74). They wrote that prejudice against women negatively impacted the innovativeness of enterprises. However, the presence of women in management positions contributed to reducing these prejudices, especially when the number of women associated with the family business reached a critical mass.

More broadly, the issue of the impact of gender of company employees, board members or research teams on the occurrence of innovations was described in a systematic literature review, among others, in the works of: TM and Joseph (2021, pp.

301-333), Khushk, Zengtian and Hui (2022, pp. 287-304), Fauzi, Sapuan and Zainudin (2023, pp. 57-75) and Mari, Poggesi, Abatecola, and Essers (2024).

2.2 Gender of Owners and Innovative Activity of Enterprises

There are relatively few publications that address the relationship between owner gender and enterprise innovation. Most of them confirm the positive impact of a female owner gender structure on innovation activity. Only a few studies either fail to support this conclusion or suggest the opposite. One of the first studies to confirm the positive impact of female co-owners on innovation activity was the work by Rosa and Sylla (2018, pp. 282-302).

This work demonstrated that small and medium-sized enterprises owned primarily by women were more innovative than enterprises owned primarily by men. A subsequent study by Ritter-Hayashi, Vermeulen, and Knoben (2019) found that gender diversity among owners and employees, as well as the presence of women in management positions, promotes enterprise innovation in developing countries. Similar conclusions are drawn from research conducted by Prabowo and Setiawan (2021, pp. 709-723).

In turn, Mulliqi's work (2025, pp. 77-110) demonstrated a positive impact of having at least one female owner on the likelihood of implementing product innovations. The author conducted her research based on enterprises located in Central and Eastern Europe and Central Asia. More extensive research in this area was conducted by Na and Shin (2019). They demonstrated that, in addition to the product innovations, a gender structure of owners that includes at least a minimal share of women also positively influences the occurrence of organizational, marketing, and RandD innovations.

However, these authors did not confirm a positive impact on the occurrence of process innovations. In this respect, the above study differs from the results presented by Zastempowski and Cyfert (2021), who found that in small and medium-sized enterprises, female owners positively influence both product and process innovations. In this type of entities, the chances of introducing product innovations were 83.7% higher and process innovations 56% higher than the chances of introducing these types of innovations in enterprises where women were not co-owners.

Daspit and Nabisaalu (2022, pp. 281-313) also discussed the positive impact of women on innovation. Their research suggests that small and medium-sized enterprises in emerging markets can be innovative thanks to varying combinations of women in ownership and workforce composition. Furthermore, these authors demonstrated that female-led companies employ more women than male-led small and medium-sized enterprises, and that a higher number of women employees positively impacts innovation outcomes.

However, different conclusions can be found in the work of Machado, Correia and Braga (2025, pp. 1-29), who state that female entrepreneurship alone is neither a sufficient nor a necessary condition for a prominent level of innovation. Similar conclusions regarding process innovation can be found in the work of Exposito, Sanchis-Liopis and Sanchis-Liopis (2024, pp. 11877-11911).

They showed that small and medium-sized enterprises run by men are more likely to achieve better results due to a greater propensity to implement process innovations compared to small and medium-sized enterprises run by women.

The publications lack consideration of the optimal ownership gender structure from the perspective of innovation activity. Most of them discussed both enterprises where the ownership gender structure included at least one woman and enterprises where the ownership gender structure included most women.

However, it should be noted that the ownership gender structure can include five basic states: 1) no women, 2) minority participation of women, 3) equal participation of women and men, 4) majority participation of women, and 5) exclusive participation of women. Furthermore, the publications presented above lack conclusions regarding the ownership gender structure most likely to result in product or process innovations. It is also worth emphasizing that the cited studies were limited to small and medium-sized enterprises. After considering the research gaps mentioned above, the following research hypotheses were formulated:

H0: Different ownership gender structures have varying degrees of influence on enterprise innovation activity. The greater the share of women in the enterprise's ownership group, the greater the likelihood of product and process innovation.

For the purposes of the above research hypothesis, two additional auxiliary hypotheses were formulated:

H0a: The most optimal gender structures of business owners from the point of view of the occurrence of product and process innovations are those that are diversified, i.e., they do not belong exclusively to men or exclusively to women.
H0b: Small and medium-sized enterprises where women constituted most shareholders were more innovative than SMEs owned mainly by men.

The second research hypothesis was formulated as follows:

H1: The intensity of the impact of gender structure on individual manifestations of innovation activity differs across enterprises of different size classes. The larger the enterprise size, the higher the probability of occurrence of individual manifestations of innovation activity can be observed with a decreasing share of female owners.

Also, for the purposes of the second hypothesis, two auxiliary hypotheses were formulated:

H1a: As the size of the enterprise increases, the probability of innovation increases for any gender structure of owners, both in the case of product and process innovations.
H1b: The probability of product innovations occurring in each gender structure of owners and in each enterprise size class was higher than the probability of process innovations occurring.

3. Methodological Aspects of the Research Conducted

The empirical data used for the calculations in the remainder of this article were obtained from the World Bank. They were collected from April 2023 to March 2025 and cover the period from 2022 to 2025.

For the purposes of this article, only companies from Southern European countries were selected. The list of countries from which the surveyed companies came from, their number, and geographical structure is presented in Table 1.

Table 1. *List of countries from which the companies included in the study came from*

No.	Name of the country	Number of enterprises	Structure
1	Portugal	1002	10%
2	Spain	1281	13%
3	Italy	1211	12%
4	Croatia	475	5%
5	Macedonia	350	4%
6	Montenegro	147	2%
7	Bosnia and Herzegovina	356	4%
8	Slovenia	398	4%
9	Serbia	497	5%
10	Malta	237	2%
11	Moldova	148	2%
12	Greece	592	6%
13	Romania	966	10%
14	Bulgaria	718	7%
15	Türkiye	1411	14%
Together		9789	100%

Source: *Own study based on data from the World Bank.*

The structure of the surveyed enterprises according to their size and the gender of their owners is presented in the next table.

Table 2. *Structure of the surveyed enterprises according to their size and the gender structure of their owners.*

Gender structure of enterprise owners from women's perspective	**0 %**	**1-49 %**	**50 %**	**51-99 %**	**100 %**	**Together**	**Structure**
Micro	1445	252	194	87	292	2270	23%
Small	2630	761	348	171	340	4250	43%
Medium	1661	537	172	110	118	2598	27%
Big	437	160	33	25	16	671	7%
Together	6173	1710	748	393	767	9789	100%
Structure	63%	17%	8%	4%	8%	100%	

Source: *Own study based on data from the World Bank.*

The study subjects were selected using stratified random sampling, which first divided the population of enterprises in the study countries into non-overlapping groups called strata. Respondents were then randomly selected within each stratum. The World Bank typically uses three levels of stratification: enterprise sector, enterprise size, and country region.

The enterprise sectors included in the study included manufacturing (ISIC 4.0 codes: 10-33) and service activities (ISIC 4.0 codes: 41-43, 45-47, 49-56, 58, 61, 62, 69-75, 79, 95). Regions in EU countries were selected based on the NUTS1 statistical divisions, and in the case of non-EU countries, on the administrative divisions of those countries.

The calculations in the next section of the article were conducted using single-factor probit modeling. This method was dictated by the binary nature of the dependent variables, which were related to the occurrence of product and process innovations in the enterprise. If a product innovation occurred in the enterprise, this variable was assigned a value of 1. If this manifestation of innovation did not occur in the enterprise, this variable was assigned a value of 0. Values for the second dependent variable, process innovation, were assigned in an identical manner.

The independent variables concerned the gender structure of the enterprise's owners. They were continuous variables, but due to the specific nature of the research method adopted, they were coded into binary format.

This coding first involved dividing the gender structure of the owners into specific values and ranges: 1) 0% - no women among the enterprise's owners; 2) 1 to 49% - a minority share of women among the enterprise's owners; 3) 50% - equal gender proportions among the enterprise's owners; 4) 51-99% - a majority share of women among the enterprise's owners; 5) 100% - the enterprise is fully owned by women. Next, the specific gender structure of the enterprise's owners was marked with the number 1 and assigned to the corresponding category. The remaining categories were

assigned the value 0. An example of binary coding, e.g., 18% share of women among the enterprise owners, is presented in Table 3.

Consequently, the independent variable, which was the gender structure of owners, was divided into five categories and the further part of the article will examine the influence of each of these categories on the dependent variables adopted for the study.

Table 3. *Example of coding the 18% share of women in the group of enterprise owners into binary form*

Structures gender owners	**0%**	**1- 49%**	**50%**	**51-99%**	**100%**
Value of an independent variable	0	1	0	0	0

Source: *Own study.*

As mentioned above, due to the binary nature of the dependent variables, calculations were performed using probit modeling. This modeling allows estimating the probability of the dependent variable reaching the value 1 for a given independent variable. The formal notation of the single-factor probit model takes the following form:

$$P(Y=1 \mid X) = \Phi(\beta_0 + \beta_1 X)$$

Where:
Φ - is the cumulative distribution function of the standard normal distribution,
$\beta_0 + \beta_1 X_1$ - this is the so-called linear predictor
$P(Y=1 \mid X)$ - the result is a number from the interval (0,1), i.e., the probability of the event Y=1 occurring given the independent variable X.

The implementation of probit modeling over multifactor modeling was dictated by the narrower but more in-depth nature of the research. While multifactor modeling allows for the simultaneous consideration of the impact of multiple, diverse independent variables on the assumed dependent variable, single-factor modeling allows for the focus on examining the impact of only one group of independent variables on the assumed dependent variable, but across different cross-sections. A weakness of this form of modeling is, of course, the lack of a comparison of the strength of the assumed independent variable relative to other independent variables.

4. Results

4.1 The Influence of the Gender Structure of Enterprise Owners on Implementing Product Innovation

The calculated probit models illustrating the relationship between the gender structure of enterprise owners and product innovations are presented in the Table below.

Based on the table above regardless of company size, the highest probability of implementing product innovation occurs in companies where women are the majority shareholders. In this group, the probability of product innovation is almost 41% higher than in companies with a different ownership gender structure.

In the case of companies with a minority ownership of women, the probability of product innovation occurrence is almost 38% higher compared to the probability of product innovation occurrence in companies where the share of women in the ownership group is greater than or equal to 50%, or where women have no ownership rights at all.

In the absence of women among the company's owners, the probability of implementing product innovation is already 30% lower than the probability of implementing the same process in companies whose at least one co-owner is a woman. However, when the company is fully owned by women, the same probability of implementing product innovation is almost 28% lower than in companies with majority or minority co-ownership by men.

In the case of micro and small enterprises, the relationship between the gender structure of owners and product innovation is like the one observed in the analysis conducted without considering enterprise size classes. This means that the most favorable ownership structure in terms of gender is a majority female ownership, followed by a minority female ownership.

In the case of a majority female ownership in micro enterprises, the probability of implementing product innovation is as much as 128.6% higher than in enterprises with a lower female share in the co-ownership group and in the group where women are sole owners of the enterprise. In the case of small enterprises, the probability was 77% higher.

However, in the case of a minority share of women, the probability of implementing product innovations was higher by 69% in micro and by 42% in small enterprises, respectively, compared to the probability of implementing product innovations in enterprises where the structure of women's share as owners was higher than half or in companies with full male ownership. It should also be added that a homogeneous gender structure of owners (only men or only women) in micro and small enterprises clearly has a negative impact on the probability of implementing product innovations.

However, different trends can be observed in the case of medium-sized and large enterprises. In the case of medium-sized enterprises, the optimal gender structure of business owners is a 50% share of women.

In such a situation, the probability of implementing product innovation is 40% higher than in enterprises with a more diverse gender structure of owners.

Table 4. *The influence of the gender structure of enterprise owners on implementing product innovations*

No.	gender structure of the company's owners from a women's perspective	parameter	S	T	P>|z|	P1	P2	χ^2	P
Micro enterprises									
1	0% women	- 0.29	0.07	-4.32	0.00	0.12	0.19	18.58	0.00
2	1-49% women	+ 0.34	0.09	3.61	0.00	0.22	0.13	12.6	0.00
3	51-99% of women	+ 0.63	0.14	4.39	0.00	0.32	0.14	18.44	0.00
Small enterprises									
4	0% women	- 0.21	0.04	-4.92	0.00	0.20	0.27	24.24	0.00
5	1-49% women	+ 0.27	0.05	5.07	0.00	0.30	0.21	25.33	0.00
6	51-99% of women	+ 0.49	0.10	4.94	0.00	0.39	0.22	23.89	0.00
7	100% women	- 0.31	0.09	-3.66	0.00	0.15	0.24	14/09	0.00
Medium enterprises									
8	0% women	- 0.26	0.06	4.05	0.00	0.24	0.32	16.25	0.00
9	50% of women	+ 0.30	0.13	2.38	0.02	0.35	0.25	5.57	0.02
10	100% women	- 0.24	0.05	4.37	0.00	0.23	0.31	19.01	0.00
Large enterprises									
11	0% women	- 0.26	0.10	-2.47	0.01	0.31	0.40	6.07	0.01
12	1-49% women	+ 0.28	0.12	2.40	0.02	0.42	0.32	5.72	0.02
13	100% women	- 0.75	0.40	-1.86	0.06	0.13	0.35	3.97	0.05
Total enterprises									
14	0% women	- 0.21	0.03	-7.15	0.00	0.20	0.26	50.63	0.00
15	1-49% women	+ 0.25	0.04	7.12	0.00	0.29	0.21	50.09	0.00
16	50% of women	+ 0.13	0.05	2.44	0.01	0.26	0.22	5.93	0.01
17	51-99% of women	+ 0.27	0.07	4.01	0.00	0.31	0.22	15.76	0.00
18	100% women	- 0.16	0.06	-2.84	0.00	0.18	0.23	8.34	0.00

S – standard error,

T – Student's T statistic for the parameter,

$P > |z|$ – probability of the parameter being insignificant,

P_1 – probability of occurrence of a given phenomenon in the studied group of enterprises,
P_2 - the probability of a given phenomenon occurring in other groups of enterprises,
χ^2 – Chi square goodness of fit test,
P – probability of model insignificance.
Source: *Own study based on own research.*

In large enterprises, the optimal gender structure of ownership is a minority share of women. In such a situation, the probability of implementing product innovation is 31% higher than in entities where the share of women as owners is anything other than 1 to 49%.

It should also be emphasized that in large enterprises with a homogeneous gender structure of owners, i.e., they are fully owned only by women or only by men, the probability of implementing product innovations was significantly lower than in enterprises with a mixed structure.

4.2 Owners' Gender Structure and Process Innovations

Based on the data in Table 5, it can be observed that the highest probability of implementing process innovation occurs in enterprises with a minority share of women. In such case, it amounts to 15%, which is 36% higher than the probability of implementing process innovation in enterprises with a different ownership gender structure.

In contrast, the lowest probability occurs in extreme cases, i.e., when the enterprise is owned solely by men or solely by women. In such cases, it totals 10% and 9%, respectively. That makes the probability of implementing process innovation in such instances 33% and 30% lower respectively, than in enterprises with more diverse ownership gender structure.

Different conclusions regarding the relationship between the gender structure of owners and process innovations can be drawn based on models established for entities broken down by enterprise size. In the case of microenterprises, the most optimal gender structure of owners was the one where women held a majority share.

In such a situation, the probability of implementing process innovations was 16%, almost 129% higher than the probability of implementing process innovations in enterprises with a lower share of female owners and in enterprises fully owned by women combined. In turn, the lack of women among the owners of microenterprises contributed to a decrease in the probability of implementing those innovations by as much as 50%.

In the next group, that being small enterprises, the most optimal ownership gender structure was the one where women were minority shareholders. In enterprises with

this ownership gender structure, the probability of implementing process innovations was 14%, which was 27% higher than in enterprises with a different ownership gender structure.

However, the lowest probability of implementing this type of innovation occurred in enterprises where women were the sole owner group.

Table 5. *The influence of the gender structure of enterprise owners on implementing process innovations*

No.	**gender structure of the company's owners from a women's perspective**	**parameter**	**S**	**T**	**P>|z|**	**P1**	**P2**	**χ^2**	**P**
Micro enterprises									
1	0% women	- 0.20	0.08	- 2.40	0.02	0.06	0.09	5.75	0.02
2	51-99% of women	+ 0.51	0.17	3.08	0.00	0.16	0.07	8.72	0.00
Small enterprises									
3	0% women	- 0.10	0.05	-1.92	0.05	0.10	0.12	3.64	0.06
4	1-49% women	+ 0.19	0.06	2.94	0.00	0.14	0.11	8.45	0.00
5	100% women	- 0.25	0.10	- 2.41	0.02	0.07	0.12	6.18	0.01
Large enterprises									
6	0% women	- 0.17	0.12	-1.44	0.09	0.16	0.21	2.09	0.09
7	100% women	- 1.30	0.18	-2.42	0.01	0.03	0.18	6.27	0.01
Total enterprises									
8	0% women	- 0.14	0.03	-4.13	0.00	0.10	0.13	17.13	0.00
9	1-49% women	+ 0.20	0.04	4.79	0.00	0.15	0.11	22.38	0.00
10	50% of women	+ 0.09	0.06	1.51	0.08	0.13	0.11	2.26	0.08
11	51-99% of women	+ 0.15	0.08	1.94	0.05	0.14	0.11	3.67	0.06
12	100% women	- 0.16	0.07	-2.40	0.02	0.09	0.12	5.96	0.01

S – standard error,

T – Student's T statistic for the parameter,

$P > |z|$ – probability of the parameter being insignificant,

P_1 – probability of occurrence of a given phenomenon in the studied group of enterprises,

P_2 - the probability of a given phenomenon occurring in other groups of enterprises,
χ^2 – Chi square goodness of fit test,
P – probability of model insignificance.
Source: *Own study based on own research.*

With this ownership gender structure, the probability amounted 7%, which was over 71% lower than in enterprises with a lower share of women in the ownership group. The last group for which probit models were obtained were large enterprises. However, as the results obtained in this group were not very precise, the only thing that can be inferred is that the least optimal ownership gender structures were those consisting either exclusively of men or exclusively of women. It should be emphasized that the probability of implementing process innovations was drastically low in enterprises fully owned by women.

In such a situation, it lasted only 3%, while the probability of implementing process innovations in enterprises where men had at least a minimal share was as much as 500% higher. In the second case, i.e., when the enterprise was owned exclusively by men, the probability of implementing process innovations was 16%, which was "only" 31% lower than the same probability in enterprises where women had at least a minimal share in the ownership group.

It should also be emphasized that, similarly to product innovations, homogeneous gender structures of business owners negatively influenced the probability of implementing process innovations.

5. Conclusions

Analyzing the research results described in the previous section, several interesting conclusions can be drawn. First, reviewing the literature on the subject reveals contradictory opinions, according to which women influence innovation activity positively, negatively, or that gender has no effect on innovation.

The lack of influence of entrepreneurs' gender on innovation activity was discussed in the work of, among others, Nählinder, Tillmar and Wigren (2015, pp. 66-86). Reutzel, Collins and Belsito (2018, pp. 430-450) reported on the lower involvement of women-owned companies in innovation compared to those of men. However, this study demonstrates that women who own or co-own enterprises have a positive impact on product and process innovation.

This is confirmed by models with negative signs for the independent variable "lack of women" in the models for both product and process innovation. Similar conclusions were previously presented in the works of, among others, Zastempowski and Cyfert (2021) and Mucollari (2024, pp. 103-109).

It should also be added that the greater the share of women as co-owners, the higher the probability of implementing product innovations, which was noticeable in each category of enterprises (micro, small, medium, and large) and, with one exception, in the overall category.

In the latter category, it turned out that the probability of implementing product innovations in enterprises with a minority share of women was higher than the probability of implementing this form of innovation in enterprises with a 50% share of women, but lower than in enterprises with a majority share of women. Only the complete absence of men among the enterprise owners caused a significant decrease in the probability of implementing product innovations.

In the case of process innovations, this trend was not observed. The highest probability of this type of innovation occurred in the group of enterprises with a minority share of women, and increasing the share of women in the ownership structure of the enterprise did not contribute to an increased probability of implementing process innovations. To summarize, the first of the main research hypotheses (*H0)* was verified positively in the context of product innovations, but negatively in the context of process innovations.

Second, the most optimal gender structure of enterprise owners from the perspective of the occurrence of product and process innovations are those that are diverse, meaning they do not belong exclusively to men or exclusively to women. In the case of process innovations, in enterprises where women did not own any shares, the probability of these innovations occurring, depending on the size of the enterprise, was 20 to 50% lower than in enterprises where women were at least minimal co-owners.

In turn, the probability of implementing process innovations occurring in enterprises where men did not own shares was from 33 to 500% lower than the probability of implementing those innovations occurring in enterprises with at least minimal male participation.

Similar conclusions were drawn for product innovations. In this type of innovation, the absence of women as co-owners meant a lower probability of implementing product innovations, depending on the size of the enterprise, from 29 to 58%, while the absence of men meant a decrease from 25 to 169%, depending on the size of the enterprise. In this respect, the obtained results are consistent with those presented by Mulliqi (2025, pp. 77-110), who demonstrated a positive impact of the gender structure of owners including at least one woman on the probability of new product implementation.

Similar conclusions can also be found in the works of Na, Shin (2019), Moreno-Gomez, Lafuente and Vaillant (2018, pp. 104-122), Madison, Moore, Daspit and

Nabisaalu (2022, pp. 281-313), Ritter-Hayashi, Vermeulen and Knoben (2019), and Sastre (2015, pp. 142-162).

However, completely different conclusions can be found in the work of Machado, Correia and Braga (2025, pp. 1-29), who state that female entrepreneurship alone is neither a sufficient nor a necessary condition for a prominent level of innovation. In conclusion, it should be emphasized that the auxiliary hypothesis (*H0a)* was fully verified positively.

Third, the findings of Rosa and Sylla (2018, pp. 282-302), among others, were confirmed. They showed that small and medium-sized enterprises where women constituted most shareholders were more innovative than SMEs owned primarily by men.

This conclusion is confirmed in the case of product innovations in the group of small enterprises with a majority share of women, where the probability of implementing product innovations was 39%, while in enterprises with a majority share of men, this probability was 30%.

Furthermore, this research can extend this conclusion to enterprises in general, regardless of size (31% and 29%), and to micro enterprises (32% and 22%). However, this study does not confirm this conclusion in the case of process innovations in the group of enterprises without division by size. In the case of this type of innovation, enterprises where men held a majority share had a higher probability of implementing innovation (15%) than enterprises owned primarily by women (14%).

Similar conclusions regarding process innovations can be found in the work of Exposito, Sanchis-Liopis and Sanchis-Liopis (2024, pp. 11877-11911). The results obtained allowed for a positive verification of the auxiliary hypothesis (*H0b)* only in the context of product innovations.

The above correlations may stem from the specific nature of process innovation, which is linked to technological solutions, which men typically perform better than women. In the case of product innovation, however, the improved position of companies with a majority female presence may be a consequence of, among other things, women's better ability to acquire ready-made solutions, introduce aesthetic and functional improvements, find new uses for existing products, and offer existing products in new markets.

Fourth, this study demonstrated that as enterprise size increases, the gender structure of owners changes, which has a positive impact on implementing product innovation. In micro and small enterprises, the highest score was observed in enterprises with a majority female ownership.

In medium-sized enterprises, the highest likelihood occurred in enterprises with a 50% female ownership. In large enterprises, the highest probability of implementing innovation occurred in enterprises with a minority female ownership structure. This allows us to conclude that the second, main research hypothesis (*H1*) was positively verified in the context of product innovation.

In the case of process innovations, a similar trend can be observed. However, due to the insufficient number of statistically significant models, these conclusions are incomplete and apply only to micro and small enterprises. In micro enterprises, the highest probability of implementing process innovations occurred when women were the majority owner, while in small enterprises, it occurred when women were the minority owner. In this respect, hypothesis (*H1)* regarding process innovations was only partially verified positively.

The issue of the impact of enterprise size on the relationship between the gender structure of owners and implementing product and process innovations has not yet been discussed in the literature and may constitute an original contribution of the authors to the development of science.

At this point, it is worth attempting to explain the above trend, that is, as the size of the enterprise increases, the most optimal structure for implementing innovation within the enterprise is the one that includes a decreasing share of women. In the case of micro and small enterprises, women who are sole or majority shareholders have a direct and immediate influence on decisions at both the tactical and strategic levels.

Female co-owners of the enterprise can personally initiate and contribute to the implementation of both product and process innovations. This stems from the fact that in these types of enterprises, women often serve as top managers, as evidenced by the relatively high Pearson correlation coefficient for micro and small enterprises (see Table 6).

However, as the size of the enterprise increases, the role of owners (especially women) may become more symbolic or limited to supporting areas such as administration, human resources, advertising, etc. Furthermore, as the size of the enterprise increases, women decreasingly serve as top managers, as evidenced by the decreasing Pearson correlation coefficient for medium and large enterprises.

In large companies, female co-owners may also self-limit themselves by delegating tactical and strategic decision-making to management board members, who are often men. To summarize, it can be concluded that the reasons for the higher innovation activity of large enterprises where men hold majority shares compared to enterprises with a different gender ownership structures stem primarily from aspects related to women remaining in the shadow and manifestations of discrimination against them, rather than from their business qualifications.

Table 6. *Pearson correlation coefficient between variables: 'gender structure of owners' and 'a woman as a top manager'*

Structure of gender owners from a women's perspective Size of Enterprises:	**100 % share**	**Majority particip ation**	**50% share**	**Minority particip ation**	**0% share**
Micro	0.59	0.22	0.16	-0.03	-0.57
Small	0.53	0.20	0.15	-0.03	-0.44
Medium	0.35	0.19	0.11	-0.02	-0.28
Large	0.31	0.17	0.09	-0.07	-0.17

Source: *Own study based on the World Bank data.*

The final finding of this study states that with increasing enterprise size, the probability of implementing innovation increases for every owner gender structure, both for product and process innovations. Furthermore, the probability of product innovations occurring for every owner gender structure and in every enterprise size class was higher than the probability of process innovations.

In this respect, this study confirms the results obtained by Teruel and Segerra (2017, pp. 319-340), who examined the impact of enterprise size on the relationship between employee gender diversity and enterprise innovation. They showed that small enterprises have greater difficulty capturing the benefits of gender diversity in innovation activities compared to large enterprises. Furthermore, they indicated that the impact of employee gender diversity on innovation differs depending on the type of innovation. The above findings allow for positive verification of the last two auxiliary hypotheses (*H1a* and *H1b*).

The above article provides several practical implications for implementing product innovations in enterprises.

First, because in the case of micro and small enterprises, the most optimal gender structure for implementing product innovations is one that includes a majority female share, it is worth supporting at the political and social levels those programs that aim to increase female entrepreneurship, while taking into account the diverse gender structure of owners.

Second, the growth of the enterprise size should be supported, because the larger the enterprise size, the greater the chances of product innovations occurring.

Third, it has been observed that the larger the size of an enterprise, the less frequently women serve as CEOs, even there where they hold a majority or exclusive stake. This limits their real influence on tactical and strategic decisions within enterprises, which consequently erodes the stimulating impact of a majority share of women in the ownership structure on the implementation of product innovation. Therefore, it is recommended to create favorable conditions that, on the one hand, enable women to acquire the appropriate competencies necessary for effective enterprise management,

while on the other – reduce the discriminatory barriers that hinder the pursuit of such positions.

Fourth, private and institutional investors may consider the gender composition of owners as a predictor of a company's level of innovation and, consequently, its growth potential. Furthermore, business environment institutions that support acceleration and incubation processes, and other startup-supporting activities, may intentionally recruit or prefer teams with an appropriate gender composition of owners.

Fifth, since micro and small enterprises where women are the majority owners are the most active in innovation among all micro and small enterprises, the issue of the gender structure of owners can be treated not only as an equality issue, but also as a strategic issue for the development of innovation.

References:

Alkharafi, N. 2024. The role of women in driving national innovation and entrepreneurship through entrepreneurial ecosystems. Journal of Innovation and Knowledge, vol. 9, no. 4.

Bannò, M., Coller, G., D'Allura, G.M. 2021. Family firms, women, and innovation. Sinergie Italian Journal of Management, vol. 39, no. 2, 59-74.

Belghiti-Mahut, S., Lafont, A.L., Yousfi, O. 2016. Gender gap in innovation: a confused link? Journal of Innovation Economics and Management, vol. 19, no. 1, 159-177.

Blake, M.K., Hanson, S. 2005. Rethinking innovation: Context and gender, Environment and Planning A, vol. 37, no. 4, 681-701.

Brush, C.G. 1992. Research on women business owners: Past trends, a new perspective and future directions. Entrepreneurship Theory and Practice, vol. 16, no. 4, 5-30.

Busolt, U., Kugele, K. 2009. The gender innovation and research productivity gap in Europe. International Journal of Innovation and Sustainable Development, 4, no. 2, 109-122.

Chen, J., Leung, W.S., Evans, K.P. 2018. Female board representation, corporate innovation and firm performance. Journal of Empirical Finance, vol. 48, 236-254.

Cheng, J.Y.J., Groysberg, B. 2020. Gender diversity at the board level can mean innovation success. MIT Sloan Management Review, vol. 61, no. 2, 1-8.

Coleman, S. 2007. The role of human and financial capital in the profitability and growth of women-owned small firms. Journal of Small Business Management, 45(3), 303-319.

Cooper, C.L., Davidson, M. 1982. High Pressure. London: Fontana.

Davidson, M., Cooper, C. 1983. Stress and the Woman Manager. Martin Robertson.

Davis, P.S., Babakus, E., Englis, P.D., Pett, T. 2010. The influence of CEO gender on market orientation and performance in small and medium-sized service businesses. Journal of Small Business Management, vol. 48, no. 4, 475-496.

Eurostat. 1981. The Economic and Social Positions of Women in the Community. European Economic Community.

Expósito, A., Sanchis-Llopis, A., Sanchis-Llopis, J.A. 2024. Entrepreneur's gender and SMEs performance: The mediating effect of innovations. Journal of the Knowledge Economy, vol. 15, no. 3, 11877-11911.

Fauzi, M.A., Sapuan, N.M., Zainudin, N.M. 2023. Women and female entrepreneurship: Past, present, and future trends in developing countries. Entrepreneurial Business and Economics Review, vol. 11, no. 3, 57-75.

Hernández-Lara, A.B., Gonzales-Bustos, J.P. 2020. The influence of family businesses and women directors on innovation. Applied Economics, vol. 52, no. 1, 36-51.

Ibáñez, M.J., Guerrero, M., Mahto, R.V. 2020. Women-led SMEs: Innovation and collaboration → performance? Journal of the International Council for Small Business, vol. 1, no. 3-4, 111-117.

Jun, W., Jamil, I., Mughal, B., Waheed, J., Hussain, H. 2020. Does working women's causes innovation: an untouched reality? E+M. Ekonomie a Management, 23(4), 102-118.

Kanter, R.M. 1977. Men and Women of the Corporation. New York: Basil Books.

Khushk, A., Zengtian, Z., Hui, Y. 2022. Role of female leadership in corporate innovation: a systematic literature review. Gender in Management: An International Journal, vol. 38(3), 287-304.

Liu, J., Zhu, S. 2024. Board gender diversity and innovation performance in manufacturing firms: What is the role of risk-taking? Finance Research Letters, vol. 68, 105936.

Loscocco, K.A., Robinson, J. 1991. Barriers to women's small-business success in the United States, Gender and Society, vol. 5, no. 4, 511-532.

Machado, D., Correia, A., Braga, A., Salamzadeh, A., Braga, V. 2025. Business innovation and internationalisation in female-owned businesses: A fuzzy-set QCA approach. Journal of the Knowledge Economy, 1-29.

Madison, K., Moore, C.B., Daspit, J.J., Nabisaalu, J.K. 2022. The influence of women on SME innovation in emerging markets. Strategic Entrepreneurship Journal, vol. 16, no. 2, 281-313.

Mari, M., Poggesi, S., Abatecola, G., Essers, C. 2024. Women entrepreneurs and innovation: Retrospect and prospect. Journal of Innovation and Knowledge, vol. 9, no. 3.

Moreno-Gómez, J., Lafuente, E., Vaillant, Y. 2018. Gender diversity in the board, women's leadership and business performance. Gender in Management: An International Journal, vol. 33, no. 2, 104-122.

Mucollari, H. 2024. Empowering women entrepreneurs: Challenges, strategies, and impact. Academic Journal of Business, Administration, Law and Social Sciences, vol. 10, no. 3, 103-109.

Mulliqi, A. 2025. The role of gender in innovation: Micro evidence from Central and Eastern Europe and Central Asia, Eastern European Economics, vol. 63, no. 1, 77-110.

Na, K., Shin, K. 2019. The gender effect on a firm's innovative activities in emerging economies. Sustainability, vol. 11, no. 7.

Nadeem, M., Bahadar, S., Gull, A.A., Iqbal, U. 2020. Are women eco-friendly? Board gender diversity and environmental innovation. Business Strategy and the Environment, vol. 29, no. 8, 3146-3161.

Nählinder, J. 2010. Where are all the female innovators? Nurses as innovators in a public sector innovation project. Journal of Technology Management and Innovation, vol. 5, no. 1, 13-29.

Nählinder, J., Tillmar, M., Wigren, C. 2015. Towards a gender-aware understanding of innovation: a three-dimensional route. International Journal of Gender and Entrepreneurship, vol. 7, no. 1, 66-86.

Özmutaf, N.M., Aktekin, E., Ergani, B., Çıta, K. 2015. The effects of innovative features of women managers on their business performance: the food exporter companies in Aegean region sample. Procedia – Social and Behavioral Sciences, 195, 220-229.

Pecis, L. 2016. Doing and undoing gender in innovation: Femininities and masculinities in innovation processes. Human Relations, vol. 69, no. 11, 2117-2134.

Prabowo, R., Setiawan, D. 2021. Female CEOs and corporate innovation. International Journal of Social Economics, vol. 48, no. 5, 709-723.

Reutzel, C.R., Collins, J.D., Belsito, C.A. 2018. Leader gender and firm investment in innovation. Gender in Management: An International Journal, vol. 33, 6, 430-450.

Rezaei, A., Martin, L., Kamali, A.R. 2024. Contribution of female inventors to technological collaboration between high-tech firms and universities in close proximity: Effect of innovative firm's characteristics. J. of Innovation and Knowledge, 9(4), 100594.

Ritter-Hayashi, D., Vermeulen, P., Knoben, J. 2019. Is this a man's world? The effect of gender diversity and gender equality on firm innovativeness. PLoS One, 14(9), e0222443.

Rodríguez Gutiérrez, P., Fuentes Fuentes, M.D.M., Rodríguez Ariza, L. 2014. Strategic capabilities and performance in women-owned businesses in Mexico. Journal of Small Business Management, vol. 52, no. 3, 541-554.

Rosa, J.M., Sylla, D. 2018. A comparison of the performance of majority female-owned and majority male-owned small and medium-sized enterprises. International Journal of Entrepreneurship and Small Business, vol. 35, no. 3, 282-302.

Ruiz-Jiménez, J.M., Fuentes-Fuentes, M.D.M. 2016. Management capabilities, innovation, and gender diversity in the top management team: An empirical analysis in technology-based SMEs. BRQ Business Research Quarterly, vol. 19, no. 2, 107-121.

Sastre, J.F. 2015. The impact of RandD teams' gender diversity on innovation outputs. International Journal of Entrepreneurship and Small Business, 24(1), 142-162.

Scase, R., Goffee, R. 1990. Women in management: Towards a research agenda. International Journal of Human Resource Management, vol. 1, no. 1, 107-125.

Shrader, C.B., Blackburn, V.B., Iles, P. 1997. Women in management and firm financial performance: An exploratory study. Journal of Managerial Issues, 355-372.

Teruel, M., Segarra, A. 2017. The link between gender diversity and innovation: What is the role of firm size. International Review of Entrepreneurship, vol. 15, no. 3, 319-340.

TM, A., Joseph, R.P. 2021. Gender and firm innovation: A systematic literature review and future research agenda. International Journal of Entrepreneurial Behavior and Research, vol. 27, no. 2, 301-333.

Turner, L. 2009. Gender diversity and innovative performance. International Journal of Innovation and Sustainable Development, vol. 4, no. 2-3, 123-134.

Tyrowicz, J., Terjesen, S., Mazurek, J. 2020. All on board? New evidence on board gender diversity from a large panel of European firms. European Management Journal, vol. 38, no. 4, 634-645.

Vehviläinen, M., Vuolanto, P., Ylijoki, O.H. 2010. Gender equality in interface organizations between science, technology and innovation. Journal of Technology Management and Innovation, vol. 5, no. 1, 64-74.

Zastempowski, M., Cyfert, S. 2021. Impact of entrepreneur's gender on innovation activities: The perspective of small businesses. PLoS One, vol. 16, no. 10, e0258661.

Zuraik, A., Kelly, L., Perkins, V. 2020. Gender differences in innovation: The role of ambidextrous leadership of the team leads. Management Decision, vol. 58, no. 7, 1475-1495.