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Exploring the Link Between Board Gender Diversity and Innovation: A Comparative Analysis of Spanish and Irish Firms

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MADRID | June 2024

1. Abstract

The purpose of this paper is to analyse the impact of board gender diversity on corporate innovation in Spanish and Irish companies. Building on previous literature that illustrates the benefits of gender diversity on corporate boards of directors, this study examines whether women directors influence innovation outcomes, using data from 29 listed companies in both Ireland and Spain, and applying descriptive statistics, cluster analysis and Pearson correlation analysis.

Key findings indicate that Spanish boards, benefiting from longer-standing gender quotas, have higher representation of women, more diverse educational backgrounds and industries of experience, and longer tenures compared to Irish boards. Cluster analysis confirmed distinct differences between both countries' boards, with the conclusion being that Spanish boards are more diverse. Pearson correlation analysis revealed a significant positive correlation between the average tenure of women directors and innovation scores, suggesting that experienced women directors enhance corporate innovation.

The research contributes to management theories such as Resource Dependence Theory, Human Capital Theory, Social Cohesion Theory and Agency Theory, all highlighting the advantages of board diversity. This study emphasises the importance of sustained gender diversity policies in promoting corporate innovation and it provides valuable insights for companies and policymakers aiming to leverage the benefits of diverse boards to drive innovation strategies.

Key words: Board Gender Diversity, Corporate Innovation, Gender Quotas, Women Directors, Corporate Governance.

1.1. Abract in Spanish

El objetivo de este TFG es analizar el impacto de la diversidad de género en los consejos de administración sobre la innovación empresarial en empresas españolas e irlandesas. Con la literatura previa que muestra los beneficios de la diversidad de género en los consejos, este estudio examina si las mujeres consejeras influyen en los resultados de innovación, utilizando datos de 29 empresas cotizadas tanto en Irlanda como en España y aplicando estadísticas descriptivas, análisis de conglomerados y análisis de correlación de Pearson.

Las principales conclusiones indican que, en comparación con los consejos irlandeses, en España, que se benefician de cuotas de género desde hace más tiempo, tienen una mayor representación de mujeres, una formación académica y experiencia en sectores más diversos y una mayor permanencia en el cargo. El análisis de conglomerados confirmó la existencia de diferencias claras entre los consejos de ambos países, con la conclusión de que los consejos españoles son más diversos. El análisis de correlación de Pearson reveló una correlación positive significativa entre la permanencia media en el cargo de las mujeres consejeras y las puntuaciones de innovación, lo que sugiere que las consejeras con experiencia mejoran la innovación empresarial.

La investigación contribuye a teorías de gestión como la Teoría de la Dependencia de Recursos, la Teoría del Capital Humano, la Teoría de la Cohesión Social y la Teoría de la Agencia, todas las cuales destacan las ventajas de la diversidad en los consejos de administración. Este estudio subraya la importancia de las políticas sostenidas de diversidad de género para promover la innovación empresarial y ofrece valiosas perspectivas para las empresas y los responsables políticos que pretendan aprovechar las ventajas de la diversidad en los consejos de administración para impulsar estrategias de innovación.

Palabras claves: Diversidad de género en los consejos de administración, innovación empresarial, cuotas de género, mujeres consejeras, gobernanza empresarial.

2. Introduction:

Throughout the past decade, the role of women on the board of directors has become of significant importance in the corporate world, and for society at large. This growing focus has occurred for several reasons: the constant increase in literature showing the benefits of gender diversity and the implications this has on company performance, and the increase of laws and legislation being passed by governments across the world, establishing minimum percentages of women that must be on the boards of directors in their countries. Ireland passed a law in 2022 stating that companies must have 33% of each gender on their boards within the commencement of the Act, and 40% within three years (Oireachtas, 2022). As of March 8th, 2024, the percentage of women on the boards of the ISEQ 20, Ireland's Overall Stock Exchange Index, has reached 40%, up marginally from September 2023, when 39% was recorded. This milestone, published on International Women's Day, shows the importance of quotas like these to make real change (O'Donovan, 2024). A similar quota is also in place in Spain. In 2007 a constitutional act was passed for effective equality between women and men, in which they recommended that by 2015 the number of women on Spanish boards of directors would be equal to that of men (*Ley Orgánica 3/2007, de 22 de Marzo, Para La Igualdad Efectiva de Mujeres y Hombres.*, 2007). In 2020 this was reviewed by the National Stock Market Commission (CNMV) and revised with the aim of reaching 40% of women representation on boards by 2022 (*Actualización del Código de buen gobierno de las sociedades cotizadas*, 2020).

Although these quotas are helping to increase the number of women on boards of directors, the question of the impact that women have on corporate innovation remains a complex subject. In this study, we will firstly look at the importance of innovation in firms and how innovation is impacted by decision/strategy making. Innovation can play an extremely important role in shaping the survival of firms. Innovation activities enable new and well- established firms to deal with the everchanging market of emerging or disruptive technologies, which in turn continuously improve their existing capabilities (Cefis & Marsili, 2006). In relation to innovation activities, the board of directors is vital in driving firms' innovative investments. The selection and prioritisation of innovation projects is a decision-making process taken by the board of

directors and is defined as complex, dynamic, and multi-staged, involving groups of decision makers (Gutiérrez et al., 2008). The board prioritises resources for innovation and R&D and supervises the resulting performance (Lakhal et al., 2024). From these sources, it is clear that innovation is a question of decision making and comes from the people at the top, and a vast amount of research has been carried out to show that having women on the board of directors can help to offer unique perspectives and insights into company strategy, accountability and decision making (Adams & Ferreira, 2009). However, to date, empirical studies on the presence of women on boards and its relation to firm innovation remain inconclusive.

The main objective of this paper, titled 'Exploring the Link Between Board Gender Diversity and Innovation: A Comparative Analysis of Spanish and Irish Firms', is to complement previous literature on the effect of board gender diversity on innovation. It also seeks to fill gaps in the research, to show that since innovation is a question of decision making, women directors have a significant impact on company innovation. To reach these goals, I will first conduct a comprehensive literature review focusing on women directors, their role, and their influence on innovation. This review will help me define a conceptual framework that will support my empirical research, ensuring the investigation is grounded in a robust theoretical foundation. The empirical research will then involve analysis of data related to the sociodemographic traits of women directors and innovation within 29 listed companies within both Ireland and Spain. By employing clustering techniques and correlation analysis, I aim to uncover meaningful insights and reach my research goals by contributing to the broader understanding of gender dynamics in corporate leadership and its link to innovation.

The structure of the thesis is designed to facilitate a comprehensive exploration of the role of women directors in fostering innovation within the 29 listed companies in Ireland and Spain. The structure begins by outlining the objectives and significance of the study. Following on, the literature review will present an in-depth analysis of existing research on women in directorial positions and their relationship with innovation strategies. Next, the methodology section will explain the research design, data collection methods and analytical methods used, while also delving into the

empirical research findings. The final section will synthesize the research findings, discuss their implications for theory and practice and offer conclusions for future research.

3. Theoretical framework

Much of the literature available regarding board gender diversity is empirical in nature and cites many management theories. Management theories that have been used in previous studies of board diversity tend to be referenced at three different levels: individual, board, and the firm. The most commonly cited theories include: Social Cohesion theory, Resource Dependence theory, Agency theory, and Human Capital theory (Reddy & Jadhav, 2019).

3.1. Human Capital Theory

The Human Capital Theory examines the educational attainment, experience, skills and knowledge of an employee and how these in turn benefit the individual and their company. It elaborates that companies have an incentive to seek productive human capital and to continue to add to the human capital of their existing employees (Carter et al., 2010). When it comes to corporate governance, diverse human capital of the board of directors is seen as a key resource for the firm; this is because each director has developed experience from their home firm, through multiple board appointments, and industry experience that they have developed from years in many respective industries. The combination of their experiences brings valuable human capital to a firm's board (Valenti & Horner, 2019). I draw upon Human Capital Theory to help explain the importance of human capital within a firm's board of directors and to measure to what extent human capital considers gender diversity as beneficial.

3.2. Social Cohesion Theory

Social Cohesion is considered an essential ingredient to address common societal challenges. Social Cohesion Theory is summarised as a sense of identity and belonging, collective attributes and behaviours characterised by positive social relations and a general orientation towards the common good (Moustakas, 2023). Social Cohesion

shows that fostering a sense of belonging and mutual support is essential to achieve goals. In terms of the board of directors, Social Cohesion can lead to improved collaboration, and communication – enhancing the board's strategic decision making and effectiveness in governance. Social Cohesion Theory suggests that boards can be better equipped to navigate firm challenges and boost an organisation's overall performance if the board is cohesive (Boytsun et al., 2011).

3.3. Agency Theory

Agency Theory analyses the relation between incentives and self-interest, and it suggests that organisational life is based upon self-interest. The theory explores the relationship between a principal (shareholders) and their agent (managers) and, given the information asymmetry that exists between managers and shareholders, managers can decide upon how much they share with shareholders. The role of the board of directors under agency theory is to become the source of truth for the shareholders within a firm (Fama & Jensen, 1983). Agency theory proves that board diversity can mitigate problems by incorporating a wide range of perspectives and expertise. Diverse boards are thought to enhance the monitoring capabilities of a firm, aligning managers' actions more closely with shareholder interests.

3.4. Resource Dependence Theory

Resource Dependence Theory is a management theory based on organisation and strategy. The theory is based upon the principle that a firm must engage in transactions with actors in the external environment in order to acquire resources and it characterizes the corporation as an open system (Lakhal et al., 2024). Much prior research suggests that alongside Agency Theory, Resource Dependence Theory (RDT) is an effective framework to examine boards. (Pfeffer & Salancik, 2003) suggest that directors bring four key benefits to organisations: information in the form of advice and counsel, access to channels of information between the firm and environmental contingencies, preferential access to resources and legitimacy. Studies have shown that firms that have powerful members of the community on their boards are able to acquire critical resources from the environment (*Resource Dependence Theory*, 2009). Researchers have suggested the Resource Dependence Theory can be extended to suggest that a

more diverse board of directors represents a largely valuable set of resources that in turn may help achieve better economic outcomes (Reddy & Jadhav, 2019). For example, diverse directors hold unique information that can potentially improve board strategic advisory to managers. Diverse boards also send positive signals to the labour market and as a diverse board creates links with important constituencies in the external environment, diverse organisations have access to more talent (Carter et al., 2010).

From the theoretical framework outlined, the integration of diverse perspectives within the board of directors is not only beneficial but necessary for a company's success. The theories, Human Capital Theory, Social Cohesion Theory, Agency Theory and Resource Dependence Theory, each provide a unique lens from which the value of the board diversity can be appreciated.

In summary, from Human Capital Theory, the diversity of education, skills and individual experiences among board members enhances the company's human capital, which strengthens its decision making and problem-solving capabilities. The Social Cohesion Theory highlights the importance of a cohesive board, in which diversity fosters a sense of belonging and support, which thereby improves collaboration and strategic effectiveness. Agency Theory shows the role of diverse boards in bridging the information gap between managers and shareholders, to ensure that the actions of managers align cohesively with shareholder interest. Finally, the Resource Dependence Theory highlights that a diverse board provides a firm with access to a broader range of resources and information, which are instrumental for thriving in the competitive business environment of today's world.

The common theme across each theory is the conclusion that diversity within the boardroom is an asset. It not only increases a board's collective human capital and strategic advisory capabilities, it also strengthens governance structures and external relations, which in turn can contribute to high firm performance. These theories help to set the stage for further exploration into how women directors influence innovation on a firm level.

4. Women on Corporate Boards

In the ‘90s, when the first study of women on corporate boards was conducted, the situation was far from where it is now, and many believed that firms would never reach anywhere close to equity between genders on boards. Very few firms at the time included women on boards of directors (Arfken et al., 2004), so few that it was forecasted by researchers that it could take about 200 years for women to attain equal and equitable representation in top corporate board positions (Elgart, 1983). This particular research examined the reason of underrepresentation of women in Fortune 500 corporations and found reasons such as ‘already filled with qualified candidates’ to excuse the 43% of companies that didn’t have a single women director on their boards. Maybe in the late ‘80s/’90s were arguments such as this acceptable; in the past 20 years, huge efforts have been made for advancements in gender equity on corporate boards.

Regulatory and societal shifts have been extremely pivotal in advocating for the number of women on corporate boards. For instance, the European Union has pushed for greater female representation on boards, which in turn has influenced corporate governance practices (Directorate-General for Justice, 2012). Furthermore, many governments have introduced mandatory gender quotas for boards, which have set precedents for other nations. Norway introduced a 40/60 women to men quota as early as 2003 (*Gender Quotas on Corporate Boards?*, 2023). Going beyond regulation and government pressure, investor and societal advocacy has also added to the demand for board diversity. Influential groups such as Catalyst and the 30% Club have been making considerable efforts to promote gender parity in the boardroom, which was noticed by corporations and certainly had a knock-on effect (Joecks et al., 2013).

As of the 2000s, the presence of women on boards of directors has been linked to many positive outcomes for firms, such as improved corporate governance, increased financial performance and enhanced decision-making processes (Carter et al., 2003). Much research has shown that women bring unique leadership styles to boards that can improve, but also complement, more traditional board functions (*The Resource Dependence Role of Corporate Directors: Strategic Adaptation of Board Composition in Response to Environmental Change - Hillman, 2002*).

4.1. Challenges and Barriers of Entry

Despite much progress in gender equality, there are still various and complex barriers that hinder women entering boardrooms. One of the most persistent challenges for women is achieving a balance between work and family responsibilities, which can significantly impact a woman's career advancement. Furthermore, cultural norms and traditional organisational structures perpetuate these challenges, making it difficult for women to break through the 'glass ceiling'.

4.1.1. Work and Family Balance

Typically, and historically, women have always been primary family caregivers for children and family members in need, such as the elderly. Oftentimes, assumptions are made regarding women's availability to do a job without interference from external familial factors. Because of these assumptions, employers occasionally hesitate to promote/appoint women as they are worried about where a women's priority lies (Akpinar-Sposito, 2013). Moreover, lack of accessible childcare remains a huge barrier to women reaching top positions and because of this, many women find it difficult or cannot balance the challenging demands of family life alongside a growing career (*Women in Leadership*, 2009). In more recent times, there has been a realization in firms that work-family initiatives are needed to pave the way for women to make it to the top.

4.1.2. Male Advocacy

Men play a crucial role as allies to women in the pursuit of gender equality, and despite the fact that there is no shortage of qualified women to fill out director roles, many men continue to have outdated attitudes towards women in top positions. In order for the system to change, women will rely on men to amplify women's voices and experiences and begin to question and denounce stereotypes that are still ever present in today's society (*Male Allies in the Pursuit of Gender Equity and Inclusion*, 2023). One of the strongest ways men can advocate for women in this way is by using their platform to elevate the perspectives and opinions of women alongside them; this is particularly potent as men's voices are often given more weight and recognition. Research has

shown that in order to improve the status of women in the workplace, much more attention should be paid to how men are involved in this achievement of equality (Ruxton & van der Gaag, 2013). A key point on male advocacy is not about women taking power from men, but about both sexes relating and speaking up in a way that has considerable potential benefit for men themselves, as well as women.

4.2. Role of Quotas in Corporate Board Diversity & Organisational Outcomes

Many scholars argue that a single women's presence on corporate boards is not enough to make a significant impact, and that it is only after a certain percentage of gender equality has been achieved that positive outcomes are seen (Joecks et al., 2013).
To back up this argument, research on the effects of the implementation of gender quotas on corporate boards finds that countries with gender diversity quotas tend to display better organisational outcomes than those without such mandates (Bertrand et al., 2019). As mentioned previously, Research Dependence Theory suggests that firms benefit from a diverse board composition, which provides wider access to unique resources and perspectives, therefore having gender quotas in place will help to do this.

Countries have had different timelines in terms of the implementation of gender quotas into their respective laws, with Norway the first country to introduce them (Atinc et al., 2021). Spain and Ireland provide a compelling comparison of the impact of gender quotas, in which Spain implemented a gender quota law in 2007 which required women to hold at least 40% of board seats of publicly listed companies by 2015. This action in legislation has led to significant increases in female representation on boards within Spain, which in turn contributes to enhanced organisational outcomes. Conversely, in Ireland a similar gender quota was only introduced more than 15 years later, in 2023. Before the quota, female board representation was primarily driven by more voluntary measures, which resulted in slower progress towards gender diversity and its benefits for countries like Ireland. These contrasting approaches to gender quotas allow me to pose my first hypothesis.

Hypothesis 1: ***Countries with gender quotas in place for longer have more diverse boards.***

5. Role of Women Directors in Firm Performance

When reviewing the literature, it is clear that different views can be extracted from the current situation in gender diversity research. One view calls for more research on the variables that moderate and mediate the relationship between gender diversity and firm performance (Torchia et al., 2018). There are many business cases that argue that adding women to corporate boards increases firm performance, in terms of equity, sales and invested capital. The attention to economic value and gender diversity reflects the capitalist view that shareholder value and profits are the main measures of corporate success (Eagly, 2016). Catalyst, an advocacy organization, released a study showing that among Fortune 500 firms, those with a higher percentage of female representatives on their boards performed better financially than those with a lower percentage. The original report, and its replications, show a link between women on boards and corporate performance (Catalyst, 2004, 2007, 2011). However, a study like Catalyst's, which involved a large group comparison, do not reveal the strength of correlation between the participation of women and the financial success. It is clear that the increasing number of women on boards is a target set by policy makers, but research is yet to categorically explain how women directors might be affecting board work in terms of firm innovation.

5.1. Leadership Styles & Governance

Much literature suggests that women directors improve the effectiveness of internal governance with their management styles, which are unique and different from those of men. A range of previous literature on managing styles concluded that women are more democratic, participative, and less autocratic and direct than their male counterparts (Eagly & Johannesen-Schmidt, 2001). Furthermore, female leaders, compared to male leaders, tend to be less hierarchical, more cooperative and collaborative, and more oriented towards enhancing their colleagues' self-worth. However, social scientists have found that typically women who pursue non female-dominated careers, such as management positions, will reject feminine stereotypes and have similar leadership styles, needs and values to their male counterparts (Nielsen & Huse, 2010). Prior

literature suggests that women are highly valued on boards as they provide unique strategic input and tend to generate more productive discourse (Bilimoria, 2006). The unique perspectives that women bring to the table may result in higher quality decision-making relating to organizational strategies. Women are also known to have participative management styles, which involves the encouragement of collaboration, promoting accountability in individuals and coming together as a team to find solutions (*Participative Leadership*, 2023). This ability allows women directors to be sensitive to decisions relating to organizational practices, such as CSR and environmental matters (Nielsen & Huse, 2010).

5.2. Innovation Performance

The board of directors is instrumental in steering innovation in a firm because it provides the strategic vision that forms the firm's approach to new ventures and projects. It is up to the board's discretion to set priorities and allocate resources to innovative projects such as Corporate Social Responsibility, Research and Development and Diversity and Inclusion (Huse, 2007). Research suggests that the relationship between the behaviour of corporate boards and a firm's overall innovativeness is mediated by innovation decision-making boards that promote projects/initiatives that are breakthrough in scope, incorporate the input of diverse constituencies within the firm, engage in frequent interactions with project teams and offer them guidance (Robeson & O'Connor, 2013). Boards with diverse perspectives are also seen to be better equipped to understand global markets and drive firm innovation, ensuring that companies respond to changes in consumer demands and technology (Nielsen & Huse, 2010). In general, research suggests that there is a positive link between innovation and firm performance, and the conclusion is that innovative companies show significantly higher profits and growth than firms that are not innovative (de Jong et al., 2003). This is likely due to firm image and the effect innovative projects/initiatives have on that image for investors and/or the target audience.

5.3. Innovation and Women Directors

Expanding upon the positive outcomes of board diversity and its relation to innovation, a litany of studies provides a comprehensive understanding of how board diversity can

influence a firm's innovative capabilities. As discussed, board diversity provides a wealth of human and social capital to the board, which can help the board to allocate resources effectively, find opportunities and generate ideas. Research has investigated the link between governance and innovation strategies, particularly on the relationship between board demographic characteristics and firm innovation (Galia & Zenou, 2012). This is expanded by (Li & He, 2020) who show that cognitive diversity, including educational background and expertise, is positively associated with corporate innovation. The study argues that having gender diversity contributes to having these diverse cognitive attributes, which in turn increase the number of ideas, promote creativity and lead to increased innovation outputs.

Ruth and Sui (2022) highlight that both board gender diversity and environmental responsibility positively affect innovative output, which is proved via higher patent levels among top-patenting firms. The study emphasises that board diversity not only directly contributes to innovation but also enhances the relationship between environmental responsibility and innovation, and it suggests a synergistic effect when these two factors are combined.

Furthermore, (Naveed et al., 2022) explore the role of normative, mimetic and coercive pressures in the relationship between board gender diversity and green innovation, particularly in industry specific contexts. Their study highlights that industry-specific institutional pressures significantly moderate the board gender diversity and green innovation relationship, underscoring the interplay between gender diversity and environmental strategies at the industry level. The study suggests that increasing the number of women on corporate boards can lead to enhanced environmental performance and innovation.

Additionally, research in the agri-food industry shows that board diversity, particularly with independent directors, plays a crucial role in promoting eco-innovation. These innovation strategies, enhanced by diversity, are associated with greater competitive capacity, access to new markets, and improved company image, all three of which are vital for sustaining long-term innovation (García-Sánchez et al., 2021). Further

literature supports the idea that diverse boards are better equipped to drive innovation. Studies indicate that women on boards tend to prioritize environmental and social responsibilities, which can then lead to more sustainable and innovative business practices (He & Jiang, 2019).

Hypothesis 2: ***Women directors and their leadership styles positively impact firm innovation.***

6. Research Methodology

6.1. Data Collection and Sample

For the empirical research, I created a database that includes the profile of each woman on the board of directors of 29 listed companies in both Ireland and Spain. The companies within the database are ones that originate in either country and are listed on the national stock exchange. The companies were chosen specifically from the Irish Stock Exchange (Euronext Dublin) and the Spanish Stock Exchange (IBEX35). This was to ensure that the companies chosen had similarities in terms of governance and size. I then used socio-demographic data, such as age, nationality, and professional background, to build the profiles of women directors and their companies in these countries. The basis for deciding the countries for the research was simple, one is my country of residence (Spain), and the other my country of birth (Ireland). Also, as explained previously, Ireland and Spain are two countries that display differing experiences of legislation on women in boards of directors, as Ireland introduced diversity quotas to their legislation a lot later than Spain, and this contrast meant the search for differences between both would be interesting.

From the original database, I created two separate datasets to be analysed, one regarding the women directors' profiles and the other for the company profiles. The directors' profiles were built upon the director's position in the company, number of years on the board, their industry of experience, their education field, age and nationality. The data retrieval process began on the 16th of January 2024 and spanned across several weeks. During the data retrieval I utilised many methods to find the required information for

each individual director. I used online resources, such as LinkedIn, corporate company websites, Wikipedia, and press releases, to find the information for each director's profile. Once I had collected all the raw data about each director and added it to the data base, I used a coding system in order to turn the data from qualitative to quantitative, so that it could then be passed through the SPSS statistical software, to find insights in relation to the directors' profiles. The coding system can be seen in the 'Supporting Sheet' of the database. In relation to the women's education and industry of experience, I decided to keep the raw data in the database, which detailed their universities and fields of study and the experience they had in the company or other companies, as many directors in the database are independent directors who are involved in several boards/companies. The raw data helps to see commonalities in the directors' experiences and helps expand their profiles.

6.2. Data Retrieval Limitation

During the data retrieval process of my research, I faced a significant barrier in determining the age of the director. This difficulty likely stems from the pervasive ageism that many women face in today's professional landscape. The issue of age discrimination is particularly seen in hiring processes, where older candidates may be unfairly overlooked due to biases against their age. This bias has been significantly recognised and has prompted professionals to recommend that individuals remove their age from their online professional presence and curriculum vitae to avoid this prejudice. Notably, research carried out by Teixeira Da Silva in 2020 highlights the extent to which age-related discrimination can influence career opportunities. Their findings suggest that such prejudice not only impacts hiring decisions, but also how professionals are perceived in their fields. Furthermore, the omission of age in professional profiles is becoming more common to avoid bias and enhance career prospects, (Teixeira Da Silva *et al.*, 2020), which in turn complicated the retrieval of this data during my research.

6.3. Variables and Measurements

As mentioned before, the original dataset was split into 2 subsets: one with data referring to each woman director of the sample, and the other with data referring to each

company of the sample. Each subset was used to reach different goals of the study: the women directors' data set was used to help identify differences in the profiles of women directors in Ireland and Spain; and the company data set helped to identify correlations between gender diversity on the board and innovation, as well as the identification of possible typologies of companies regarding these two constructs – gender in boards and innovation.

Tables X and Y summarise all variables used in the data analysis, and the way they were measured.

Variable	**Meaning**	**Measure**	**Supporting literature**
Company Country	Country where the company is listed	1: Ireland 2: Spain	Not applicable
Company industry	The industry of the director's company	1: Food 2: Manufacturing 3: Financial Services 4: Sales/Marketing 5: Retail 6: Aviation 7: Hospitality 8: Oil/Energy 9: Telecommunications 10: Operations/Distribution 11: Engineering	Not applicable
Same nationality	If the nationality of the director is the same as the company country	1: Yes 2: No	(Dodd *et al.,* 2022)

Executive position	The position the director holds on the board	0: Non-executive 1: Executive	(Inglis, 1994)
Tenure years	The number of years each woman has held their position on the board of directors	Continuous variable	(Livnat et al., 2021)
Industry of experience	The industry of experience the director has	1: Audit Services 2: Financial Services 3: Professor 4: Human Resources 5: Customer Service 6: Law	(Carter et al., 2010)
Education field	The field of education of the director	1: Humanities and Arts 2: Social Sciences 3: Law 4: Business 5: Medicine/Science 6: Engineering	(Carter et al., 2010)
Age range	The age range that the director is within	1: 30-40 2: 40-50 3: 50-60 4: 60-70 5: 70-80	(Jonson et al., 2020)

Table X. Variables of the women director's dataset

Variable	**Meaning**	**Measure**	**Supporting literature**
Company industry	The industry of the company	1: Food 2: Manufacturing	Not applicable

		3: Financial Services 4: Sales/Marketing 5: Retail 6: Aviation 7: Hospitality 8: Oil/Energy 9: Telecommunications 10: Operations/Distribution 11: Engineering	
Company country	The country of the company of the director	1: Irish 2: Spanish	Not applicable
Company innovation	The number of times the word 'innovation' is mentioned in each company's most recent annual report	Continuous variable	Company annual reports
Number of Women	The count of women within the board	Continuous variable	(Naveed et al. 2022) (*Gender Quotas on Corporate Boards?*, 2023)
Tenure years average	Average number of years women of the company's board have had on the board of directors	Continuous variable	(Livnat et al., 2021)
Executive position	Do any of the women of the	0: No 1: Yes	(Basco et al., 2019)

	company's board hold an executive position in the company?		
Main industry of experience	This variable represents the most frequent industry of experience among the women of each company's board	1: Audit Services 2: Financial Services 3: Professor 4: Human Resources 5: Customer Service 6: Law	(Carter *et al.*, 2010)
Main education field	This variable represents the most frequent field of education among the women of each company's board	1: Humanities and Arts 2: Social Sciences 3: Law 4: Business 5: Medicine/Science 6: Engineering	(Carter *et al.*, 2010)
Average age range	The average age range of the women of the board	Continuous variable	(Jonson et al., 2020)
Number of nationalities	The number of different nationalities among the women of the board	Continuous variable	(Dodd *et al.,* 2022)
Number of experience industries	The number of different industries of experience among the women of the board.	Continuous variable	Not Applicable

Number of education fields	The number of different education fields among the women of the board	Continuous variable	Not Applicable
Innovation	The number of times the word 'innovation' is mentioned in each company's most recent annual report	Continuous variable	Company annual reports

Table Y. Variables of the company dataset

6.4. Data analysis

For the data analysis of this study, a two-step cluster analysis was employed, using SPSS version 28, to identify natural groupings in the two aforementioned datasets. Although the two-step cluster analysis approach is particularly well suited for large datasets (which was not the case for the dataset in this study), it can accommodate both continuous and categorical variables, making it suitable for the mixed data types in this thesis. The two-step cluster analysis is a non-parametric method which is used to identify clusters of objects that share characteristics with other members of a certain group but are dissimilar to objects from other groups (Torres Olave, 2019). It is a hybrid approach, which uses distance measure to separate groups and then a probabilistic approach to choose the optimal subgroup model (Benassi et al., 2020). Software packages such as SPSS are used to calculate the measure of similarity or dissimilarity between pairs of objects. Objects that have smaller distances between one another are more similar, and those with larger distances are more dissimilar. In the pre-clustering phase of the two-step cluster analysis, the algorithm scans the dataset to form small sub-clusters, this is done using a sequential clustering approach. Each data point is evaluated to determine whether it should be merged into an existing cluster or create a new cluster. In the second step, the sub-clusters are grouped into final clusters using a hierarchical clustering method. The Bayesian Information Criterion (BIC) is used to

determine the optimal number of clusters, and thus does not require the researcher to establish an a priori clustering solution (Sarstedt & Mooi, 2019).

Furthermore, to explore the relationship between board gender diversity and corporate innovation, a correlation analysis was conducted. Correlation analysis is a statistical method used to measure the strength and direction of the relationship between two variables. In this study, a Pearson correlation analysis was conducted with the aim to identify significant associations/correlations between the key variables in the datasets and the innovation score of each company. Pearson correlation is beneficial in this analysis as it measures the linear relationship between continuous variables, providing a correlation coefficient, *r*, that ranges from -1 to 1. An *r* value closer to 1 indicates strong positive correlation, whereas an *r* value closer to -1 indicates a strong negative correlation, and 0 suggests no correlation (Nettleton, 2014). The use of Pearson correlation analysis in this study helps to identify whether increases in one variable (e.g. The number of women on the board of directors) are associated with increases or decreases in another variable (e.g. Innovation score). Through the use of correlation analysis, the study aims to provide empirical evidence on the relationship between board gender diversity and innovation.

7. Results and Findings

This section presents a comprehensive overview of the findings which derived from the data analysis carried out, which had the aim of comparing and exploring the relationship between board gender diversity and corporate innovation in companies from Ireland and Spain. The analysis began with the calculation of descriptive statistics, which provided a detailed summary of the key characteristics of the dataset. This offered initial insights into the central tendencies and the variability of the data presented. Following the descriptive statistics, a two-step cluster analysis was carried out to uncover natural groupings/clusters within the two datasets. This clustering technique allowed for the identification of distinct clusters based on the composition of the board of directors and the particular profiles of women directors. Finally, a Pearson correlation analysis was conducted to examine the strength and direction of the relationships between various board diversity variables, such as the number of women on the board, their average

tenure and their educational backgrounds, and corporate innovation. This correlation analysis aimed to highlight the impact of board diversity on the innovative capabilities of firms, to provide an understanding of how diverse board compositions may help drive corporate innovation.

7.1. Descriptive statistics of both datasets

The descriptive statistics provide an overview of the key characteristics of both datasets. They help to understand the distribution of the data and form the basis for further analyses.

Dataset 1: Companies Subset

Descriptive Statistics

	N	Minimum	Maximum	Mean	Standard Deviation
num_women	29	2	7	4,93	1,361
tenure_years_avg	29	1,5	8,3	4,728	1,7478
num_exper_indus	29	1	5	2,66	1,045
num_edu_field	29	1	5	2,90	1,113
age_range_avg	29	2,3	4,0	3,228	,4407
num_nationalities	29	1	5	2,41	1,240
innovation	29	0	191	46,93	48,578

Table 1: Descriptive Statistics Companies Subset

Number of Women on the Board: The number of women on the boards of the companies within the dataset ranged between 2 and 7, showing an average of approximately 4.93 women per board. The standard deviation of 1.361 indicates a moderate variation in the number of women across different board. This suggests that some companies are clearly meeting a higher standard of gender diversity; however, others still have fewer women on their boards. According to a study by The Wall Street Journal, GMI analysis of nearly 400 companies showed that the smallest board size has an average of 9.5 board directors and large boards are defined as those with over 14 members. Overall, companies have an average of 11.2 board directors (Lublin, 2014). From the database created for this study, the average number of board members on the

29 listed Spanish/Irish companies is 12.62. With the average number of women being 4.93, this shows that on average 39% of boards in Spanish and Irish companies are women. This figure aligns with the quota legislation of Ireland, which seeks for 40% board gender equality by 2025, and shows progress towards Spain's quota of 50/50 equality within board of directors.

Average Tenure of Women Directors: The average tenure of women directors on the board ranged from 1.5 to 8.3 years, with the average number of years being 4.7. The standard deviation of 1.748 shows a variation in the tenure lengths and this suggests that some women have served significantly less time than more seasoned women directors. Women have been on boards of directors for many decades now, the first identified women being Clara Abbott, who served two terms on the board of Abbott Laboratories from 1900 – 1908 and 1911 – 1924 (Larcker & Tayan, 2013), and of course they are increasingly being appointed due to a number of factors. However, this research shows that the average tenure of women directors in the companies studied is 4.7 years, which is slightly below the global average of 5.1 years as reported by the Deloitte Global Boardroom Program (Oven et al. 2022).

Number of Industries of Experience of Women Directors: From the women in the 29 companies researched, five key industries of experience were identified. These industries range from sectors such as financial services, engineering, and law. The range of industries within the research highlights the broad spectrum of professional backgrounds among the directors studied. The standard deviation of 1.045 indicates that there was a moderate level of variability in the industry of experience of the women directors, which reflects diverse professional backgrounds of the women's profiles. As seen from Resource Dependence Theory, which posits that organisations should strive to manage external dependencies by ensuring access to essential research, directors with diverse experiences hold unique information and assets that can improve board strategic advisory, and directors with varied industry experience represent a critical resource for firms by leveraging their diverse perspectives and skills (Carter et al., 2010).

Number of Fields of Education of Women Directors: The number of fields of education represented among women directors within the dataset was 5. The standard deviation of 1.113 suggests a moderate level of diversity in the educational backgrounds of the directors. This shows that the women across the boards within the dataset come from various academic disciplines, spanning sectors such as medicine, social sciences and business. The varied academic backgrounds contribute to a breadth of knowledge and different perspectives to board strategy and decision making. Similar to the director's industry of experience, having diverse educational backgrounds supports Resource Dependence Theory. By leveraging the diverse educational experiences of board members, a firm can develop more comprehensive internal capabilities, thus enhancing its strategic independence.

Average Age Range of Women Directors: The average age range of women directors was between age bracket 2 (40-50 years old) and age bracket 4 (60-70), with the average age range of 3.228, referring to the age bracket between 50-60 years old. This average age range figure shows that the majority of women directors in the dataset are within a mature age range in their careers, which can provide the board of directors' composition with a wealth of experience and stability. Studies have shown that boards with an older average age of directors perform better than boards with a younger average age (Jonson et al., 2020). The standard deviation of 0.4407 shows that there is some variation in the ages of the women directors; however, it is relatively concentrated.

Number of Nationalities Represented by Women Directors: The nationalities represented in the descriptive statistics highlight the different nationalities held by the women directors and this ranges from 1 to 5. The standard deviation of 1.240 reflects a diversity in nationalities among the women, indicating that the boards within the dataset are composed of women from different cultural backgrounds. A study by (Dodd *et al.,* 2022) shows that, within the same firm, cultural diversity (which is based upon a director's ancestry or nationality) increases a board's ability to incorporate stakeholder concerns into corporate decision making, therefore making more well-informed decisions for the firm. Thus, the diverse cultural backgrounds seen in the dataset can

enhance understandings and perspectives within the board, which is extremely valuable for firms.

Innovation Score: The innovation score, which was measured by the number of times the word 'innovation' appeared in each company's annual report, ranged from 0 to 191, with an average score of 46.93. The high standard deviation of 48.578 shows considerable variability in how companies reflect innovation within their annual reports. This finding suggests that while some companies are highly innovative and value innovation largely in their annual reports, others do not emphasise and mention innovation as much. The wide range in innovation scores shows that companies vary quite significantly in their commitment to innovation and their ability to communicate their innovation efforts effectively to their investors and consumers. Some companies prioritise innovation as a core aspect of their strategies; however, others lag in innovation due to a number of factors, resulting in lower scores and less emphasis about innovation in their reports. This innovation variability highlights the importance of understanding the different factors that drive innovation in firms, such as board composition and organisational culture.

However, it is important to consider the potential limitation of the way in which innovation has been measured. The dependence of the word 'innovation' in the company's annual reports could lead to potential manipulation of language to meet different purposes. Companies may emphasis the term in order to align with strategic narratives rather than accurately reflecting their genuine innovation activities, thus preventing the innovation score used in this paper from truly representing the actual weight innovation holds for the management team. While the innovation score provides an initial insight into how companies discuss innovation today, it may not fully capture the nuanced reality of their innovation practices and commitments. The variability highlights the necessity of understanding the different factors that drive innovation in firms, such as organisational culture and board composition, and it suggests that there is a need to find more sophisticated measures of innovation that could better reflect its true impact and significance.

Dataset 2: Women Subset

Descriptive Statistics

	N	Minimum	Maximum	Mean	Standard Deviation
tenure years	142	1	18	4,70	3,126
age range	143	1	5	3,22	,742
N valid (by list)	142				

Table 2: Descriptive Statistics Women Subset

Tenure Years of Women Directors: The tenure years of women directors within the dataset ranged between 1 to 18 years, with a mean tenure of 4.70 years. The standard deviation of 3.126 shows considerable variability in tenure lengths among the directors. This rather wide range and variability highlights the diversity in experience levels among women on boards of directors, with some women having recently joined boards and others bringing substantial experience on their board of directors. According to (Livnat et al., 2021), longer board tenure is associated with firm stability and higher future returns, suggesting that more seasoned directors can contribute to sustained corporate performance by leveraging their deep understandings of a firm's internal and external environments.

Age Range: The average age range of women directors was between 30 and 80 years old, with the average age range of 50-60 years old. The standard deviation of 0.742 shows that there is some variation in the age range of the women directors. The descriptive statistics show that many women on the boards within the dataset are within the 50-60 age range which provides experience and stability to the board's composition. Much research argues that age variety broadens the cognitive behavioural repertoire and views of the board and leads to better choices and improvements in performance within the firm (Harrison & Klein, 2007). A study carried out in 2015 finds, using empirical research on 205 firms from three European countries, concluded that greater age diversity on boards of directors leads to higher levels of corporate performance (Muñoz-Torres, *et al.,* 2015)

7.2. Defining women directors in Spain and Ireland

This section examines the similarities and differences in the profiles of women directors in Spain and in Ireland, by analysing the findings from the women director's dataset. This comparative analysis aims to provide insights into how board gender diversity varies between these two European countries, and how different cultural environments and regulatory strategies have influenced these differences.

The number of women on the boards of companies in Spain and Ireland vary significantly. Spanish boards, in general have a higher average number of women compared to Irish boards. This disparity primarily comes from Spain's longer standings gender quota laws, which as mentioned previously have been in place since 2007. Quotas like these are extremely effective in increasing the number of women on corporate boards and integrating more diversity, and they mandate a significant representation of women on corporate boards. In contrast, Ireland only introduced similar legislation in 2022, which in turn has resulted in a slower increase in female board representation. Therefore, this study finds the empirical evidence to support Hypothesis 1, that is, *countries with gender quotas in place for longer have more diverse boards*. This finding is also in line with previous literature from (Smith, 2018), who argues that gender quotas are extremely effective as a means to increase the number of women on boards of directors and that decision making processes improve with this greater level of gender diversity.

Furthermore, the average tenure of women directors in Spain is generally longer than that of the women directors in Ireland. Similarly, this can be linked to the earlier implementation of gender quotas in Spain, which have allowed women to establish and sustain their positions over a longer period of time. The longer tenure in Spain suggests that women have had more time to integrate into the board culture and influence decision making processes, while in Ireland women are still relatively new to corporate board activities.

Women directors in both countries come from a varied industry of experience. In Spain and in Ireland the most common industry of experience is 2, which refers to the

financial services industry, meaning that most of the directors work within this industry. In Ireland, corporation tax is extremely low at 12.5%, therefore this attracts many multinational companies to have their European offices and headquarters in the country (Stewart, 2013), many financial services companies such as Deloitte, Accenture and KPMG have large offices in Ireland, thus providing the landscape for many women directors in the country to have experience in this industry. Moreover, the field of education for women directors in both Spain and Ireland is 4, which refers to the business discipline, showing that both sets of directors come from similar educational backgrounds and bring forward similar perspectives to their respective boards as a result.

In terms of nationality, the dataset shows that a higher proportion of Spanish women directors share the same nationality as the firms they work in, meaning that more Spanish women work in Spanish companies, than that of their Irish counterparts, whose boards exhibit more international diversity, with a larger number of their directors hailing from different national backgrounds. A study by (Estélyi & Nisar, 2016) finds that having diversity in terms of nationality is useful in providing varied perspectives, ideas and information to the board of directors, which, in turn, increase the capacity of the firm to make more effective strategic decisions.

Moreover, the clustering analysis of the women director's dataset revealed two distinctive clusters of medium quality, defined by the nationality of the board to which the women directors belonged.

Cluster 1 consists of Irish boards, in which the main company industry is Financial Services and women directors also hold significant experience in the Financial Services industry. In cluster 1, the majority of women directors hold non-executive positions (90.9%) and also tend to share the same nationality as their firm (52.7%).

Cluster 2 is comprised of Spanish boards, where the main company industry is also seen to be Financial Services, and women directors have experience predominantly in the industry of Financial Services too. However, a higher number of women directors in

this cluster hold non-executive positions (93.8%) and share the same nationality as the firm they belong to (79%).

The clusters indicate that Spanish boards, represented as company 2, have a more diverse profile compared to Irish boards. Spanish women directors tend to have a broader range of educational background and expertise. The lower percentages seen alongside educational background and experience industry on the below table show that Spanish boards, while similar to that of their Irish counterparts, still demonstrate more diversity in these areas.

As mentioned, the more heterogeneous composition of Spanish boards is likely linked to Spain's longer-standing gender diversity quotas and policies that have promoted equality on boards since 2007.shwo These results, drawn from the women's subset, demonstrate the relevance of discrete variables in shaping the profiles of the women on corporate boards in Spain and Ireland.

Clústeres

Importancia de entrada (predictor)

1,0 0,8 0,6 0,4 0,2 0,0

Clúster	2	1
Etiqueta		
Descripción		
Tamaño	59,6% (81)	40,4% (55)
Entradas	company_country 2 (98,8%)	company_country 1 (100,0%)
	comp_industry 3 (27,2%)	comp_industry 3 (27,3%)
	same_nationality 1 (79,0%)	same_nationality 0 (52,7%)
	tenure_years 5,19	tenure_years 3,93
	education 4 (38,3%)	education 4 (54,5%)
	experience_industry 2 (55,6%)	experience_industry 2 (61,8%)
	age_range 3,28	age_range 3,16
	exec_position 0 (93,8%)	exec_position 0 (90,9%)

Table 3: Clustering Women Directors Dataset

7.3. Defining boards femineity in Spain and Ireland

The analysis of the discrete variables provided insights into the distinctive characteristics of Spanish and Irish boards. The discrete variables used in the analysis include the company industry, country of the company, executive positions held by board members, main industry of experience and the main education field of the women on the boards.

The clustering identified two main clusters, corresponding to the nationality of the company, which highlights the differences between Irish and Spanish boards. In general, Spanish boards exhibited greater diversity in several areas. Spanish boards had a higher proportion of women with varied industries of experience and educational backgrounds, compared to the Irish boards. The most frequent industry among women on Spanish boards was Financial Services (code 2) and Business (code 4) was the most prominent educational field.

A notable difference was observed between the two clusters, in terms of executive positions. It was seen that in Spanish companies, a larger share of women directors held non-executive positions, while Irish boards had a slightly higher percentage of women in executive roles (44.4%). This differentiating distribution of executive positions suggests variations in how gender diversity manifests in leadership roles across the two countries.

Interestingly, the two clusters coincide with all discrete variables; however, the key differences can be seen in the average values of the variables. For instance, the typical Irish board is characterised by a predominant company industry of Financial Services (code 3) and a main industry of experience of Financial Services (code 2), while Spanish boards, with lower percentages, show a broader range of industries and experiences among the women directors and their companies.

The findings from the results of the discrete variables call attention to the importance of considering national contexts when analysing board diversity. The structural differences between Irish and Spanish boards provide a foundation for understanding how national policies and cultural factors can influence board diversity and the roles women occupy within these boards.

Clústeres

Importancia de entrada (predictor)

1,0 0,8 0,6 0,4 0,2 0,0

Clúster	1	2
Etiqueta		
Descripción		
Tamaño	52,9% (9)	47,1% (8)
Entradas	company_country 1 (100,0%)	company_country 2 (100,0%)
	comp_industry 3 (33,3%)	comp_industry 3 (50,0%)
	main_exper_indust 2 (100,0%)	main_exper_indust 2 (87,5%)
	main_edu_field 4 (77,8%)	main_edu_field 4 (62,5%)
	exec_position 0 (55,6%)	exec_position 0 (62,5%)

Table 4: Clustering Discrete Variables

From the clusters of continuous variables, two distinct clusters were found from the dataset, the Irish boards cluster (1) and the Spanish boards cluster (2) that allow me to derive the following findings. We can see that, generally speaking, Spanish boards are more diverse, with a higher average number of women per board. This reflects the aforementioned longer-standing gender quotas. Additionally, these women have slightly more diverse education fields and industries of expertise.

Apart from nationality, where Irish boards show a higher level of international diversity, Spanish boards seem to not only have more women on average, but also women who serve a longer tenure. This longer tenure suggests greater stability and experience

among the women directors on Spanish boards. The quality of the clusters is classified as medium, showing that there is a clear distinction between Irish and Spanish boards; however, the classification of the cluster is not highly robust.

Clústeres

Importancia de entrada (predictor)

1,0 0,8 0,6 0,4 0,2 0,0

Clúster	2	1
Etiqueta		
Descripción		
Tamaño	55,2% (16)	44,8% (13)
Entradas	company_country 2 (100,0%)	company_country 1 (100,0%)
	num_nationalities 2,00	num_nationalities 2,92
	num_exper_indus 2,88	num_exper_indus 2,38
	num_edu_field 3,12	num_edu_field 2,62
	num_women 5,19	num_women 4,62
	tenure_years_avg 5,04	tenure_years_avg 4,35
	age_range_avg 3,25	age_range_avg 3,20

Table 5: Clustering Continuous Variables

7.4. Correlation between gender diversity in boards and company innovation

The correlation analysis was conducted to explore the relationship between gender diversity on corporate boards and the level of innovation within firms. This section discusses the key findings from the Pearson correlation analysis, which is used to measure the strength and direction of linear relationships between continuous variables.

Correlaciones

		num_women	comp_industry	company_country	exec_position	tenure_years_avg	main_exper_indust	num_exper_indus	main_edu_field	num_edu_field	age_range_avg	num_nationalities	innovation
innovation	Correlación de Pearson	,274	-,067	,436*	,109	,462*	-,060	,135	,332	,206	,129	-,152	1
	Sig. (bilateral)	,150	,729	,018	,575	,012	,770	,484	,165	,284	,504	,431	
	N	29	29	29	29	29	26	29	19	29	29	29	29

*. La correlación es significativa en el nivel 0,05 (bilateral).
**. La correlación es significativa en el nivel 0,01 (bilateral).

Table 6: Correlation between Feminine Boards and Innovation

The variables analysed include the number of women on the board, the company industry, the company country, the executive position the directors hold, the average tenure of the women directors, the main industry of experience, the number of industries of experience, the main education field, the number of education fields, the average age range of the directors, the number of nationalities and innovation. The descriptive statistics and correlation coefficients provide us insights into how these variables interact and impact corporate innovation. We find that only the country where the company is listed and the average tenure in the board of women directors have a significant corelation with the company's innovation as reflected in its annual report.

Company Country and Innovation: There is a significant positive correlation between the company country (with Spain coded as 2) and innovation scores ($r = 0.436$, $p = 0.018$). This suggests that Spanish companies tend to exhibit higher levels of innovation from a communication point of view, by mentioning innovation activities more in their annual reports, compared to Irish companies. This correlation could once again reflect the impact of Spain's longer-standing gender quotas and legislation, which have contributed to firms being able to foster an environment where innovation is more predominant and therefore is prominently reflected in company annual reports. Spain's comprehensive and early adoption of policies that support gender diversity on boards may contribute to a culture that values and promotes innovative thinking as we have seen from the review of previous literature that innovation is a question of decision making, and women directors are known to positively influence decision making in firms (Lakhal et al., 2024) (Gutiérrez et al., 2008).

Average Tenure of Women Directors and Innovation: The average tenure of women directors shows a positive significant correlation with innovation scores ($r = 0.462$, $p = 0.012$). This indicates that companies with longer-serving women directors are more likely to emphasise innovation in their annual reports. Longer board tenure indicates that shareholders are satisfied with their directors and that the board is effective at advising and monitoring managements and firm activities (Livnat et al., 2021). This shows that longer serving directors have a deeper understanding on the company's strategic goals and a more stable influence on corporate governance, thus promoting innovation activities. Directors with longer tenures on the board are capable and highly familiar with the firms on whose boards they sit, but they also have the institutional standing and motivation to offer honest advice to the top management, monitor them and successfully influence other board members when needed (Bonini et al., 2022), From the trust and influence these longer-tenured women directors hold, they can guide firms through complex challenges and seize opportunities for innovation . This aligns and helps to prove hypothesis 2, which states that *women directors and their leaderships styles positively impact firm innovation.*

Number of Women on the Board: Although not statistically significant, the number of women on the board has a positive correlation with innovation scores ($r = 0.274$, $p = 0.150$). This slight trend suggests that higher representation of women on the board of directors could be associated with increased innovation, also aligning with hypothesis 2. The presence of more women on the board of directors, as seen in the literature review, can introduce diverse ideas and foster a culture of inclusion. Inclusion is seen by (Steele & Derven, 2015) as a virtuous cycle, which states that once the firm is open to diverse perspectives, they will be able to generate new ideas and thus build a culture of innovation. Even though the Pearson correlation is not strong enough to be significant, it suggests further exploration on the idea that gender-diverse boards of directors are more likely to explore new ideas and drive innovation.

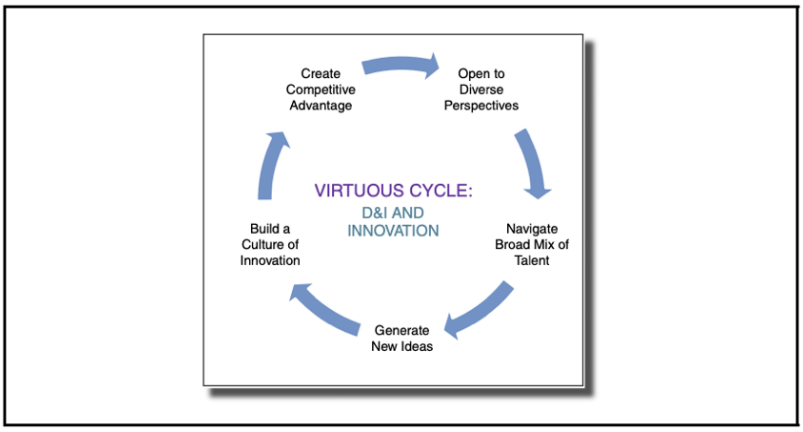

Figure 1: A virtuous cycle

Other Variables: The number of educational fields, industries of experience and the main educational field of women directors all show positive, yet not statistically significant correlations with innovation. These variables all highlight the potential importance of women directors having diverse backgrounds, with varied educational and industry experiences that they can draw upon to enhance the board's ability to develop innovative strategies. Variables such as the company industry, main industry of experience, average age range, number of nationalities and executive position show weaker and non-significant correlations with innovation. While these factors certainly contribute to overall diversity and dynamics of the board of directors as seen from the literature review, they have not been found from the empirical research to influence the level of innovation communicated in company annual reports. It suggests that the impact of these variables is likely more complex and dependent on context, therefore requiring further research on them to fully understand their influence and link to innovation.

8. Discussion and Conclusions

This thesis sets out to explore the relationship between board gender diversity and corporate innovation, with a focus on companies in Ireland and Spain. Through a comprehensive analysis of previous literature, data analysis of descriptive statistics, cluster analysis and Pearson correlation analysis, several key findings and insights were

identified. This section synthesises these findings and discusses their implications for theory, practice, and for future research to fill the gaps in the research.

8.1. Key Findings

Descriptive Statistics: The descriptive statistics were useful to highlight significant differences in the profiles of women directors between Spanish and Irish boards of directors. The key conclusion derived from these statistics showed that Spanish boards tend to have a higher number of women directors, with greater diversity in educational backgrounds and industries of experience, and longer tenures on the boards they served compared to Irish boards. As discussed throughout this thesis, these differences were found to be largely attributed to Spain's longer-standing implementation of gender quota legislation. These results confirm Hypothesis 1, which states that countries with gender quotas in place for longer have more diverse boards.

Cluster Analysis: The cluster analysis revealed two distinct clusters derived from the datasets created for the purpose of this thesis, one representing the profiles of the women directors and the other representing the companies included in the analysis. In both cases, two clusters were found, which were derived from the country variable. From the cluster analysis, Spanish boards were once again found to be more diverse, by having a higher average number of women directors on their boards, with more diverse educational fields and a broader range of industries of experience. Additionally, Spanish boards showed a higher average tenure for women directors and less international diversity compared to Irish boards, which exhibited greater nationality diversity among directors. These results also confirm Hypothesis 1.

Correlation Analysis: The Pearson correlation analysis investigated the relationship between board diversity variables and corporate innovation. The key findings were a significant positive correlation between company country (Spain) and innovation scores, showing that Spanish companies, again supported by the longer-standing gender quotas, had higher levels of diversity on their boards which in turn causes them to tend to emphasise innovation more in their annual reports. Furthermore, another significant positive correlation was found between the average tenure of women directors and

innovation scores, showing that longer-serving women directors positively affect corporate innovation, which compliments previously literature on the topic. Although not statistically significant, a positive trend was observed between the number of women and the innovation scores, which helps to support the hypothesis that gender diversity enhances innovative capabilities. Hypothesis 2 is thus confirmed.

8.2. Implications for Theory

Resource Dependence Theory: The diversity in industry experience and educational backgrounds among women directors provides valuable resources and perspectives to the board, which in turn enhances the strategic advisory capabilities of the board. Spanish boards, with their higher diversity, are found to be better positioned to leverage these resources and use them to drive innovation.

Human Capital Theory: The varied educational backgrounds and the long tenures of some of the women directors within the dataset contribute to the human capital of the board, which helps to enhance decision-making and problem-solving capabilities. This is highlighted through the positive correlation between tenure and innovation, which shows that experienced directors bring valuable knowledge and stability to the board.

Social Cohesion Theory: The presence of diverse women directors on the boards helps to foster a sense of belonging and mutual support within the board, which can improve collaboration and strategic effectiveness. Spanish boards, having higher representation of women, may benefit more from these social cohesion dynamics than their Irish counterparts.

Agency Theory: The positive trend seen from the dataset between the number of women directors and innovation suggests that gender diverse boards are more effective in guiding corporate strategy towards innovational outcomes. The inclusion of women on boards helps to enhance the board's monitoring capabilities, which in turn better aligns manager's actions with the interests of the shareholders.

8.3. Implications for Practice

Gender Quotas: A key finding that came from the data analysis were the significant differences between Irish and Spanish boards in terms of the level of gender diversity each of them has. This finding underscores the importance and effectiveness of gender quotas in promoting board gender diversity. Policymakers should consider implementing and also strengthening current gender quotas to improve board diversity, which in turn helps to drive corporate innovation.

Tenure Policies: From the data analysis, the positive effect of longer tenures on the board was highlighted. Longer tenures contribute to stability and continuity, which allows the directors to have a more substantial and influential impact on corporate governance and can guide the board towards innovative decision-making. Therefore, boards should consider policies that support the retention of experienced women directors.

Board Composition: While Spanish boards showed less international diversity than their Irish counterparts, the inclusion of directors from around the world can help to enhance global perspective and strategic insights. Companies should therefore strive for a balance between national and international diversity among their board composition, while also prioritising those who have diverse educational and industry backgrounds, all of which can help to enhance board's strategic advisory functions.

8.4. Future Research

While this study has provided valuable insights and fulfilled its aim, it also shows limitations to be addressed in future research.

Firstly, expanding the sample size to include listed companies from more diverse industries and countries would enhance the generalisability of the findings. More in-depth comparative studies across different cultural and regulatory contexts (such as the differences we have seen between Ireland and Spain) would provide a much more comprehensive understanding of the profiles of women directors around the world and

their impact on board diversity. Moreover, it would be valuable for future research to include longitudinal studies to examine the long-term impact of board gender diversity and corporate innovation, in order to provide a deeper understanding of how diversity influences innovation and other factors, including firm performance over time.

Future research could also include in-depth qualitative studies, unlike this one which is empirical in nature. Through these qualitative studies, researchers could identify and explore the specific ways in which women directors contribute to innovation. Qualitative tools like interviews and focus groups could provide rich insights into the experiences and perspectives of women directors, which help to enhance decision-making on firm strategies. Using in-depth qualitative research would also help to delve deeper into the impact of specific diversity factors, such as educational background and nationality, which was a gap unable to be filled through this particular study. A rich understanding of the unique contributions of each factor would help in designing future targeted policies. Furthermore, research into the interaction between these diversity factors and other board characteristics, such as board size or executive position held by the director, would help to provide a more nuanced understanding of how diversity can influence innovation.

9. Declaración de Uso de Herramientas de Inteligencia Artificial Generativa en Trabajos Fin de Grado

ADVERTENCIA: Desde la Universidad consideramos que ChatGPT u otras herramientas similares son herramientas muy útiles en la vida académica, aunque su uso queda siempre bajo la responsabilidad del alumno, puesto que las respuestas que proporciona pueden no ser veraces. En este sentido, NO está permitido su uso en la elaboración del Trabajo fin de Grado para generar código porque estas herramientas no son fiables en esa tarea. Aunque el código funcione, no hay garantías de que metodológicamente sea correcto, y es altamente probable que no lo sea.

Por la presente, yo, Ella Khavia, estudiante de 4E4 – Grado en Administración y Dirección de Empresas de la Universidad Pontificia Comillas al presentar mi Trabajo Fin de Grado titulado "Exploring the Link Between Board Gender Diversity and Innovation: A Comparative Analysis of Spanish and Irish Firms" declaro que he utilizado la herramienta de Inteligencia Artificial Generativa ChatGPT u otras similares de IAG de código sólo en el contexto de las actividades descritas a continuación [el alumno debe mantener solo aquellas en las que se ha usado ChatGPT o similares y borrar el resto. Si no se ha usado ninguna, borrar todas y escribir "no he usado ninguna"]:

1. **Brainstorming de ideas de investigación:** Utilizado para idear y esbozar posibles áreas de investigación.
2. **Metodólogo:** Para descubrir métodos aplicables a problemas específicos de investigación.
3. **Sintetizador y divulgador de libros complicados:** Para resumir y comprender literatura compleja.
4. **Revisor:** Para recibir sugerencias sobre cómo mejorar y perfeccionar el trabajo con diferentes niveles de exigencia.

Afirmo que toda la información y contenido presentados en este trabajo son producto de mi investigación y esfuerzo individual, excepto donde se ha indicado lo contrario y se han dado los créditos correspondientes (he incluido las referencias adecuadas en el TFG y he explicitado para que se ha usado ChatGPT u otras herramientas similares). Soy consciente de las implicaciones académicas y éticas de presentar un trabajo no original y acepto las consecuencias de cualquier violación a esta declaración.

Fecha: 4 junio 2024

Firma: 

Ella Khavia

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11. Annex

Descriptive Statistics

	N	Minimum	Maximum	Mean	Standard Deviation
num_women	29	2	7	4,93	1,361
tenure_years_avg	29	1,5	8,3	4,728	1,7478
num_exper_indus	29	1	5	2,66	1,045
num_edu_field	29	1	5	2,90	1,113
age_range_avg	29	2,3	4,0	3,228	,4407
num_nationalities	29	1	5	2,41	1,240
innovation	29	0	191	46,93	48,578

Table 1: Descriptive Statistics Companies Subset

Descriptive Statistics

	N	Minimum	Maximum	Mean	Standard Deviation
tenure years	142	1	18	4,70	3,126
age range	143	1	5	3,22	,742
N valid (by list)	142				

Table 2: Descriptive Statistics Women Subset

Clústeres

Importancia de entrada (predictor)

1,0 0,8 0,6 0,4 0,2 0,0

Clúster	2	1
Etiqueta		
Descripción		
Tamaño	59,6% (81)	40,4% (55)
Entradas	company_country 2 (98,8%)	company_country 1 (100,0%)
	comp_industry 3 (27,2%)	comp_industry 3 (27,3%)
	same_nationality 1 (79,0%)	same_nationality 0 (52,7%)
	tenure_years 5,19	tenure_years 3,93
	education 4 (38,3%)	education 4 (54,5%)
	experience_industry 2 (55,6%)	experience_industry 2 (61,8%)
	age_range 3,28	age_range 3,16
	exec_position 0 (93,8%)	exec_position 0 (90,9%)

Table 3: Clustering Women Directors Dataset

Clústeres

Importancia de entrada (predictor)

1,0 0,8 0,6 0,4 0,2 0,0

Clúster	1	2
Etiqueta		
Descripción		
Tamaño	52,9% (9)	47,1% (8)
Entradas	company_country 1 (100,0%)	company_country 2 (100,0%)
	comp_industry 3 (33,3%)	comp_industry 3 (50,0%)
	main_exper_indust 2 (100,0%)	main_exper_indust 2 (87,5%)
	main_edu_field 4 (77,8%)	main_edu_field 4 (62,5%)
	exec_position 0 (55,6%)	exec_position 0 (62,5%)

Table 4: Clustering Discrete Variables

Clústeres

Importancia de entrada (predictor)

1,0 0,8 0,6 0,4 0,2 0,0

Clúster	2	1
Etiqueta		
Descripción		
Tamaño	55,2% (16)	44,8% (13)
Entradas	company_country 2 (100,0%)	company_country 1 (100,0%)
	num_nationalities 2,00	num_nationalities 2,92
	num_exper_indus 2,88	num_exper_indus 2,38
	num_edu_field 3,12	num_edu_field 2,62
	num_women 5,19	num_women 4,62
	tenure_years_avg 5,04	tenure_years_avg 4,35
	age_range_avg 3,25	age_range_avg 3,20

Table 5: Clustering Continuous Variables

Correlaciones

		num_women	comp_industry	company_country	exec_position	tenure_years_avg	main_exper_indust	num_exper_indus	main_edu_field	num_edu_field	age_range_avg	num_nationalities	innovation
innovation	Correlación de Pearson	,274	-,067	,436*	,109	,462*	-,060	,135	,332	,206	,129	-,152	1
	Sig. (bilateral)	,150	,729	,018	,575	,012	,770	,484	,165	,284	,504	,431	
	N	29	29	29	29	29	26	29	19	29	29	29	29

*. La correlación es significativa en el nivel 0,05 (bilateral).
**. La correlación es significativa en el nivel 0,01 (bilateral).

Table 6: Correlation between Feminine Boards and Innovation

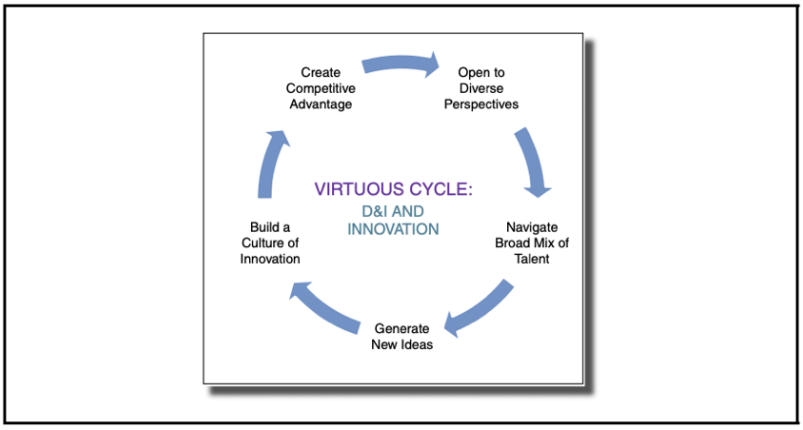

Figure 1: A virtuous cycle