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Gender and Innovation During a Business Crisis

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ABSTRACT

This research investigates the relational construction of gender and innovation within small and medium enterprises (SMEs) during systemic business crises. Moving beyond essentialist, trait-based perspectives, this study adopts a processual feminist lens to explore how gendered organizational practices shape innovative capacity during disruptions. Drawing on a quantitative sample of 6900 SMEs from 25 countries, we analyze how gendered leadership (Female CEOs), the relational configuration of the workforce, and institutional egalitarianism influence innovation. Rather than viewing gender as an isolated explanatory variable or a set of fixed traits, we conceptualize innovation as a performative enactment that is both constrained and enabled by institutional inequality regimes. Our findings challenge the static assumptions of social role theory by demonstrating that crises disrupt traditional gender scripts. We argue that the increased participation and innovative contributions of women during crises are not temporary departures from stereotypes, but represent a strategic navigation of gendered power structures within the firm. For practice, we suggest that SMEs can achieve sustainable competitive advantage only by dismantling previous organizational logics and recognizing innovation as an outcome of diverse, intersectional organizational processes rather than individual-level gendered traits.

1 | Introduction

A firm's ability to compete is tied to its strategic competitive advantage (Bakry et al. 2024; Rubio-Andrés et al. 2024). Although small and medium enterprises (SMEs) often lack the vast resource pools of multinational corporations (MNCs), they must innovate in the global marketplace, shifting supply chains, and rapid technological disruptions (Agyapong 2021). Innovation (capacity to consistently convert knowledge and ideas into new products, processes, and systems) is the primary mechanism through which SMEs survive and challenge larger, resource-rich rivals (Lawson and Samson 2001).

However, despite the importance of innovation to organizational success, it remains a gendered construct. Scholarship has historically treated innovation as a neutral outcome, yet recent research suggest that the very definition of innovation is often coded as masculine, privileging high-tech, product-based outputs over the collaborative and process-oriented innovations where diverse workforces operate (Nentwich 2022). Although 33% of SMEs globally are managed by women and workforce participation exceeds 50% (World Bank 2022), the relational construction of gender and innovation, particularly during periods of organizational crisis, remains critically underresearched (Rydström 2025).

At present, much of the literature on gender and innovation reinforces essentialist logics by treating gender as an isolated demographic variable or a set of traits (e.g., empathy, resilience) (Guerra-Arrau and Stecher 2025), a tendency that maintains existing gender knowledge regimes (Jones et al. 2019). This study challenges these essentialist foundations by conceptualizing gender as a set of internalized roles and employ a poststructuralist feminist lens (Al-Asfahani et al. 2024). We argue

that gender is a performative and relational process produced through organizational hierarchies and institutional norms. Consequently, we move beyond the question of if women innovate differently, to ask: *How do gendered organizational substructures and inequality regimes shape innovative capacity in SMEs during systemic crises*?

We examine this through a large-scale quantitative analysis of 6900 SMEs across 25 countries, focusing on the interplay between female leadership (CEOs), workforce composition, and institutional egalitarianism. Unlike traditional models that view crises as external shocks to which men and women react based on biological or socialized predispositions, we frame crisis as a disruptive site where gendered organizational scripts are undone and renegotiated (Al-Asfahani et al. 2024; Meyerson and Scully 1995; Kuran and Khabbaz 2026). This perspective allows us to analyze how crisis conditions destabilize traditional ideal worker norms, necessitating new, contextual enactments of leadership and innovation that have previously been undervalued in masculine-coded industry models.

Our study makes two primary theoretical contributions. First, we advance the gender-innovation literature by replacing the trait-based paradigm with a processual framework that views innovation as a consequence of relational power rather than individual gendered behavior. Second, we demonstrate that crisis-driven innovation in SMEs is not a result of female stereotypes (e.g., communal leadership) but rather a strategic navigation of institutional inequality regimes (Acker 2006). By focusing on how female-led firms in diverse contexts (i.e., fintech in Kenya to digital governance in India (Nahar et al. 2025)) leverage collaborative innovation, we highlight how organizational resilience is built by dismantling, rather than reinforcing, gendered binaries.

This research illustrates that for the 358 million SMEs worldwide (Dyvik 2024), innovation is not a gender-neutral phenomenon. In a post-pandemic landscape marked by geopolitical and supply chain shocks (Vanany et al. 2021), the survival of SMEs depends on recognizing that innovation is an intersectional accomplishment (Holvino 2010; Rodriguez et al. 2016). By investigating the impact of institutional development and gender egalitarianism across 25 nations, we analyze how power, context, and performativity converge to drive SME resilience in an era of permanent disruption.

2 | Theoretical Background

2.1 | The Gendered Substructure of Organizations: From Variables to Inequality Regimes

Past management research treated gender as a static demographic variable, often relying on social role theory (SRT) to explain behavioral differences as a product of internalized social expectations (Eagly and Wood 2016). Although SRT provides a foundational understanding of how men and women are socialized into specific roles, contemporary feminist scholarship suggests research should transition toward a relational and processual framework (Nentwich 2022). In this view, we conceptualize the SME not as a gender-neutral economic entity but as a site of inequality regimes, interlocking practices, meanings, and processes that maintain racialized and gendered hierarchies (Acker 2006).

In the specific context of small and medium enterprises, these regimes are often more visible than in larger corporations because organizational practices are inextricably linked to family, owner, and domestic dynamics. Here, the doing of gender is an intersectional performance shaped by the specific social and material conditions of the firm (Vershinina et al. 2020). This includes the often-invisible mental load that bridges the domestic and professional spheres that frequently dictates the pace and nature of female participation in SME leadership (Dwivedi et al. 2025). Consequently, the presence of women in a firm is not merely a numerical change in staffing; it represents a potential reconfiguration of the firm's organizational substructure, challenging the ideal worker norm that typically favors individualistic, masculine-coded agentic behaviors (Rydström 2025).

Innovation has historically utilized masculine archetypes, where the ideal innovator is depicted as an individualistic, risk-taking, and competitive subject (Proudfoot et al. 2015). This research framework undervalues women's contributions by categorizing them as supportive rather than innovative (Al-Asfahani et al. 2024). However, systemic crises cause major market instability that acts as a change mechanism. These shocks expose the limitations of masculine individualism and necessitate a shift toward relational innovation: a collaborative, process-oriented form of problem-solving that is rooted in collective intelligence rather than individual heroics (Guerra-Arrau and Stecher 2025).

In these moments of instability, firms with a higher female presence are better positioned to undo traditional gender scripts (Nentwich and Kelan 2014; Wajcman 2017). The presence of a critical mass of women allows for the legitimation of voice behavior (Eibl et al. 2020), providing a collective platform where collaborative suggestions can challenge the prevailing masculine hierarchy that has historically silenced or misrecognized female labor. By changing these gender knowledge regimes, female-inclusive firms move beyond essentialist traits like empathy and instead enact a strategic navigation of institutional precarity (Jones et al. 2019; Guerra-Arrau and Stecher 2025).

The role of leadership in fostering innovation is similarly gendered. Women in top management often face a perceived lack of fit with the requirements of executive roles, which are still modeled after masculine archetypes of authority (Rink et al. 2019). To navigate this, women leaders must often act both as appearing professionally assertive to maintain legitimacy while adhering to feminine-coded communal expectations to avoid social backlash (Heilman 2015). In highly male-dominated environments, this pressure can lead to defensive performativity, where women leaders may distance themselves from other women to survive the hierarchy (Derks et al. 2016).

However, our research suggests that a female CEO's ability to drive innovation is a relational accomplishment rather than an

individual one. When a female CEO is supported by a significant female presence in the workforce, the organizational substructure is effectively re-coded. This synergy facilitates a more inclusive decision-making process, allowing the firm to leverage relational labor to adjust production and services during a crisis (Garikipati and Kambhampati 2021). In this context, resilience is not a female trait but a consequence of dismantling the traditional ideal worker model in favor of a more flexible, collaborative organizational logic (Kuran and Khabbaz 2026).

Compounding the interrelational elements, national context also influences the relationship and we investigate. We distinguish between formal institutional quality and informal cultural norms as distinct yet overlapping inequality regimes. Formal institutions are characterized by the rule of law and regulatory enforcement that codifies gender equality (Chowdhury et al. 2019). These structures provide a legal architecture that reduces the informal power of masculine gatekeepers, thereby legitimizing women's participation in innovation (Brush et al. 2022). Gender egalitarianism is the unwritten social rule that decides how we are expected to act as men or women so that we make sense to the people around us (House et al. 2004). In societies with high gender egalitarianism, the cultural noise that devalues women's contributions is diminished. Here, empowerment is not an individual trait but is contextual. In such environments, women's innovative contributions in SMEs are more likely to be recognized and institutionalized as strategic assets (Cheraghi et al. 2019).

By synthesizing these perspectives, we argue that the innovation probability of an SME during a crisis is a function of the interaction between firm-level relational configurations (workforce and leadership) and macro-level regulatory scripts. Our research supports that women can contribute their best ideas only when a workplace stops assuming that men are the innovators and women are just the helpers.

3 | Hypothesis Development

3.1 | Gendered Organizational Substructures and Innovation Under Crisis

In general management research, innovation is frequently depicted as a masculine endeavor, where men are perceived as more innovative than women even when their objective outputs are identical (Proudfoot et al. 2015). This perception is often reinforced by self-reported data suggesting that men possess a higher sense of creative self-efficacy in business contexts (Kaufman 2006; Jonason and Kroll 2015). The past research utilized role congruity theory, which explains how we judge people based on stereotypes. This theory suggests that because innovation involves taking risks and being bold, people often wrongly label it as a masculine trait. Conversely, communal characteristics—such as nurturing, teamwork, and affiliation—are relegated to the feminine sphere (Hmieleski and Sheppard 2019).

Because the ideal innovator is modeled on these masculine archetypes, women's contributions are frequently marginalized or rendered invisible within organizational hierarchies (Al-Asfahani et al. 2024). This is not a result of a deficit in individual traits, but a consequence of inequality regimes that privilege masculine-coded expressive styles while devaluing the collaborative and relational labor often performed by women. Within these regimes, innovative ideas from women are more likely to be ignored or overlooked in favor of those that align with the dominant masculine script (Eisler et al. 2017).

In many cultures, a reserved or passive demeanor is socially desired for women, making forceful or loud creative expression socially unacceptable. Violation of these gendered scripts often results in prejudice or professional exclusion (Eagly and Karau 2002; Heilman 2015). Consequently, women in male-dominated environments may adopt the role of tempered radicals, strategically navigating a version of their creative potential that is tempered to maintain professional legitimacy (Meyerson and Scully 1995). This performance of gender (doing gender) is an intersectional accomplishment shaped by the specific social and material conditions of the firm (Vershinina et al. 2020).

Systemic crises cause major marketplace disruptions that act as revelatory mechanisms, exposing the limitations of the traditional individualist-agentic model of innovation. Shocks to the supply chain and geopolitical stability necessitate a shift toward forms of innovation that prioritize resilience and inclusive problem-solving (Vanany et al. 2021). During periods of economic turbulence, preserving employee capabilities becomes more critical than individualistic competition (Maley 2019).

Although essentialist perspectives might label these collaborative approaches as communal traits, a post-structuralist lens recognizes them as relational enactments that become strategically visible when traditional masculine scripts of business as usual fail to address the disruption (Guerra-Arrau and Stecher 2025). In extreme contexts, the resilience of female-inclusive firms is driven by organizational cohesion and unexpected networks that bypass traditional masculine gatekeepers (Kuran and Khabbaz 2026; Nahar et al. 2025).

The relational configuration of the workforce is critical in this transition. Research into deliberative participation suggests that gender inequality in participation is not just about the presence of women but the rules of the interaction; as the number of women increases, the agentic norms of the group begin to shift (Karpowitz et al. 2012; Mendelberg et al. 2014). In SMEs with a large women population, the ideal worker norm is weakened, and the social influence of gendered behavior is lessened (Rydström 2025).

This reconfiguration of the organizational substructure facilitates the legitimation of voice behavior (allowing collaborative and process-oriented suggestions to be recognized as strategic innovations rather than support labor) (Eibl et al. 2020; Jones et al. 2019). When companies stop treating innovation as men's work and support as women's work, they can use empathy and care to solve problems. This people-first approach helps businesses survive in today's unstable and competitive economy (Guerra-Arrau and Stecher 2025). Although women may be labeled as risk-averse in traditional studies, we argue this is based upon work, cultural, and home pressures (Dwivedi et al. 2025; Rodríguez-Covarrubias and Alvarez-Figueroa 2025).

Consequently, we argue that an increased presence of women within an SME re-codes the firm's substructure, allowing for the deployment of the collaborative strategies essential for surviving disruptive environments (Sörensson and Ghannad 2024).

H1. *During a business crisis, a firm's innovation probability increases when female representation in the workforce is higher.*

3.2 | Female Leadership and Workforce Composition: Disrupting the Masculine Substructure

There are relatively few women in top management globally (Dyvik 2024; World Bank 2022) but is not only a product of individual role expectations, but a consequence of institutional inequality regimes that define leadership through a masculine-coded script (Al-Asfahani et al. 2024). Traditional organizational logic often renders women unintelligible as leaders due to a perceived lack of fit with the competitive, aggressive, and individualistic archetypes of the ideal executive (Rink et al. 2019). For a woman to reach the CEO position in an SME, she must often navigate a complex set of power relations, balancing professional authority with shifting gendered expectations (Bako and Syed 2018).

Feminist research suggests that when women achieve top leadership, they are uniquely positioned to challenge the staid organizational norms that marginalize feminized ways of working. Rather than possessing innate nurturing traits, female CEOs often enact relational leadership styles that prioritize employee development, collaborative procedures, and the removal of institutional barriers. This is particularly salient in SMEs, where flatter hierarchies allow a leader's actions for innovation to permeate the entire organization more effectively (Bakry et al. 2024; Rubio-Andrés et al. 2024).

However, the transformative potential of a female CEO is not an isolated variable; it is relational and contextual. When a female CEO is supported by a significant female presence in the workforce, it creates a collective capacity to challenge masculine norms and legitimizes innovative enactments (Nentwich and Kelan 2014). In these configurations, the ideal worker norm is transformed that creates a more favorable voice climate (Eibl et al. 2020) and ensuring that diverse, process-based innovations are not only proposed but acted upon (Jones et al. 2019).

During a business crisis, this synergistic relational configuration becomes a primary driver of innovation and continued firm success. Although masculine-coded leadership often pivots toward rigid command-and-control strategies under pressure, female-led firms with diverse workforces are more likely to leverage interactive leadership for collective intelligence (Garikipati and Kambhampati 2021; Kuran and Khabbaz 2026). This allows for a better assessment of stakeholder interests, leading to superior innovation outcomes during disruption.

By integrating these dynamics, we move away from the essentialist assumption that women are inherently more supportive. Instead, we argue that the combination of a female CEO and high female workforce participation creates an alternative organizational substructure (Rydström 2025). This structure legitimizes the collaborative and affective labor necessary for innovation, turning what was previously a gendered affinity into a formalized strategic advantage (Nahar et al. 2025).

H2. *During a business crisis, the presence of a female CEO will positively moderate the relationship between female presence in the firm and innovation.*

3.3 | Institutional Development as a Regulatory Regime for Gendered Innovation

Firms do not operate in a vacuum; they must navigate regimes of truth to obtain legitimacy and institutional support (Deephouse and Carter 2005). In many global contexts, these regimes are built upon masculinized norms of dominance, where women face systemic disadvantages when navigating administrative agencies and resource gatekeepers (Li and Atuahene-Gima 2001; Brush et al. 2022). Where institutional oversight is weak, informal social norms (often favoring hegemonic masculinity) permit practices of intimidation and marginalization that stifle the innovative potential of women (Liani et al. 2021; Bako and Syed 2018).

Institutional development is defined as the degree to which a country has codified the undoing of gendered inequality through formal structures. In high-quality institutional environments, the rule of law and entrenched civic services provide a regulatory landscape that protects fundamental liberties and reduces the social penalty for women who deviate from traditional gender scripts (Wu et al. 2016; Qaiser et al. 2023). Recent research suggests that institutional quality is not a neutral metric but a gendered intervention; it represents a country's capacity to disrupt the self-reinforcing cycles of discrimination that characterize weak development contexts (Klasen 2020).

For example, in contexts with weak institutional development (i.e., Nigeria), women are often positioned as structurally unequal across social and economic life, leaving them with limited ability to challenge local, patriarchal inequality regimes (Bako and Syed 2018; Chitongo and Ojogiwa 2021). Contrarily, robust institutional development integrates gender equality into the industrial relations (IR) policies. These frameworks (i.e., equal opportunity laws, safety regulations, and diversity compliance) act as a formal check on informal masculine power (Rao and Kelleher 2003). In countries where fair-work laws are strictly followed, companies stop expecting employees to act like work-robots who have no outside lives. This makes it safer for women to be creative and lead projects without being ignored or losing their chance at a promotion (Bustelo et al. 2019; Flabbi et al. 2019).

Drawing on a processual feminist lens, we argue that high-quality institutions facilitate the legitimatization of women's innovative performances. Strong institutions mitigate gender-based barriers not just by providing resources but by fundamentally shifting the rules of the game (Brush et al. 2022). They provide the social and legal protections necessary for women to

engage in risk-taking and assertive decision-making; actions that are often penalized in weak institutional environments where innovator is a category reserved for men.

During a business crisis, this regulatory environment becomes increasingly important. In a turbulent marketplace, there is often a regression to traditional, essentialist gender scripts as firms retreat to safe masculine archetypes. However, strong institutional development ensures that diversity and inclusion policies are maintained as strategic assets rather than discarded as luxuries (Garikipati and Kambhampati 2021; Kuran and Khabbaz 2026). By protecting against bias, high-quality institutions allow firms with high female representation to convert their collaborative and relational labor into formal innovation outcomes, even under extreme pressure (Sörensson and Ghannad 2024; Nahar et al. 2025).

H3. *High institutional quality will positively moderate the relationship between female presence in the firm and innovation.*

3.4 | Gender Egalitarianism: The Discursive Landscape of Innovation

Formal regulatory quality and the informal cognitive-cultural norms shape organizational behavior. Although high-quality formal institutions offer structural protections and reduce systemic uncertainty (Qaiser et al. 2023), gender egalitarianism operates as an informal regime of truth. It influences the collective expectations regarding which behaviors are considered appropriate for specific bodies. In a feminist processual framework, we view egalitarianism not merely as a set of beliefs but as a regulatory discourse that either enables or constrains the doing and undoing of gender in professional settings (Al-Asfahani et al. 2024).

The cultural dimension of gender egalitarianism (categorized in the GLOBE study) measures the extent to which a society minimizes gender role differences and promotes fairness (House et al. 2004). However, contemporary research suggests that these cultural norms are not just background factors but are active participants in the relational construction of power (Rodriguez et al. 2016). In societies with low gender egalitarianism, innovation and leadership are seen as a masculine-agentic script. In these contexts, women are often culturally relegated to communal or domestic spheres, meaning that even when they participate in the workforce, their innovative contributions are systematically undervalued or ignored within the prevailing hierarchy (Yousafzai et al. 2015; Rodríguez-Covarrubias and Alvarez-Figueroa 2025). This lack of cultural legitimacy creates a mental load that restricts women to propose radical changes, as their primary value is seen as supporting the existing masculine hierarchy (Dwivedi et al. 2025).

Conversely, in countries with high levels of gender egalitarianism, the ideal worker and ideal innovator archetypes are less rigidly gendered. These societies provide the cultural space for women to perform assertive and pro-active innovation without facing the social penalties associated with deviating from traditional scripts (Cheraghi et al. 2019; Kuran and Khabbaz 2026). In such environments, the presence of a female workforce is more likely to be translated into innovation because the cultural noise that usually silences women's voices is diminished. Empowerment in these contexts is not an individual trait but a contextual one provided by an egalitarian discursive landscape (Otterbach et al. 2021).

During a business crisis, these informal norms become even more critical. When external pressure is high, firms in low-egalitarian cultures often regress to hyper-masculine command structures, further marginalizing the collaborative and relational labor essential for resilience. Under these conditions, risk-taking is coded as a male prerogative, and female employees are expected to absorb the emotional labor of the crisis without gaining the authority to innovate through it (Grandey and Sayre 2019). However, in high-egalitarian cultures, the organization is more likely to maintain a fluid, inclusive approach to problem-solving. Here, women's voice behavior (Eibl et al. 2020) is not only accepted but is recognized as a vital strategic resource for innovation (Garikipati and Kambhampati 2021; Sörensson and Ghannad 2024). We argue that gender egalitarianism acts as a moderator, dictating whether the innovative potential inherent in a diverse female workforce will be suppressed by traditional gender hierarchies or legitimized as a driver of SME resilience.

H4. *High gender egalitarianism in a country will positively moderate the relationship between female presence in the firm and innovation.*

Thus, we propose the model (see Figure 1).

4 | Methodology

4.1 | Background

Our global paper represents 25 countries. The study examines each country's institutional environment and how this will affect gender and innovation. Institutional development refers to a country's governance structures and policies that support growth and development. Our research measures the institutional development of a country based on the World Bank Governance Indicators: the rule of law, regulatory quality, political stability, government effectiveness, control of corruption, and voice and accountability, which are widely used to measure formal institutional environment strength and development in the cross-country setting (i.e., Alam et al. 2019; Ngobo and Fouda 2012; Tashman et al. 2019).

4.2 | Sample

We prepared a novel dataset of 6900 SMEs across 25 countries to examine the impact of female participation in the workforce on innovation during the COVID-19 crisis. Our data are based on the complementary survey conducted by the World Bank during COVID-19 to assess the impact of the pandemic on firms across countries. The World Bank's COVID-19 survey (June 2020, after the first COVID-19 wave) followed the latest wave of the

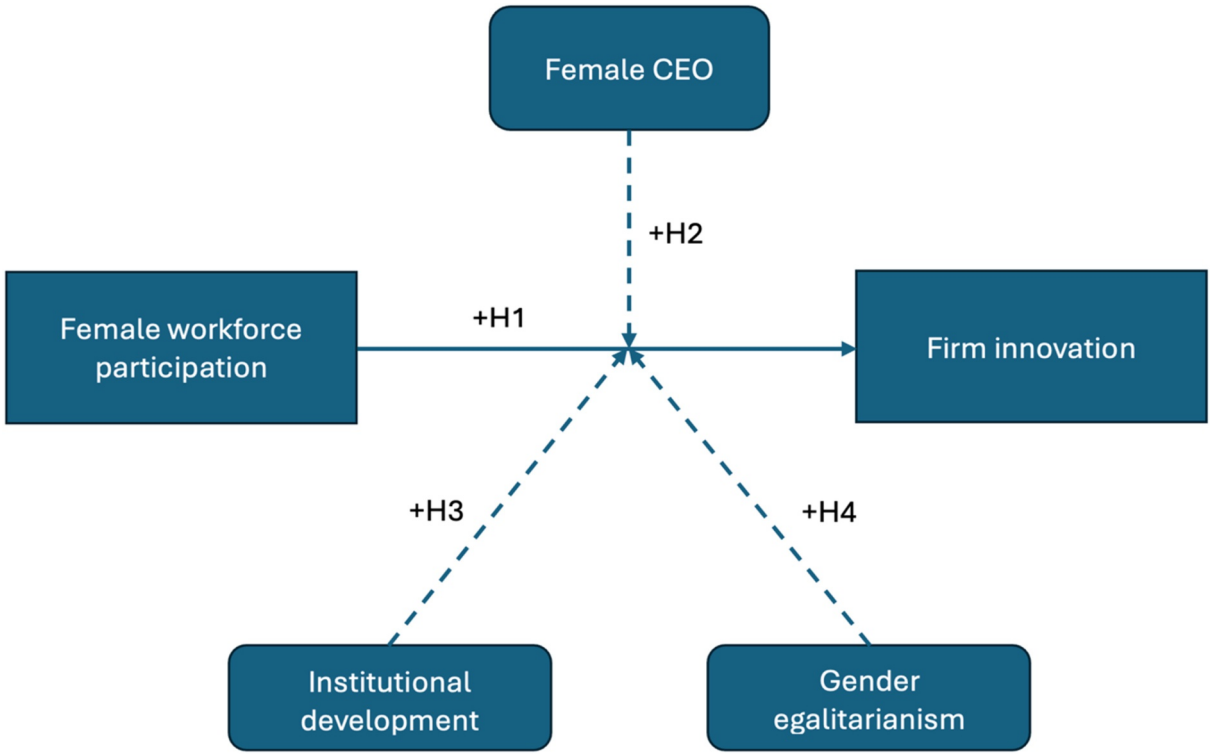

FIGURE 1 | The conceptual model and hypotheses.

selected countries' World Bank Enterprise Surveys (WBES) during 2018 and 2019 (both surveys administered by the World Bank and followed the same method of data collection). As both these surveys were conducted for the same set of firms, we prepared the dataset by combining the COVID-19 survey with the latest wave (2018 or 2019) of WBES. It has allowed us to combine the relevant firm-level innovation variables during COVID-19 with other firm-level variables (e.g., demographics, ownership, and top manager-related variables) from the pre-COVID survey of the same firms. It permitted us to control the pre-pandemic firm-level explanatory variables. These World Bank surveys have been widely used in recent management research to study the impact of COVID-19 on various firm-level outcomes, such as innovation (Krammer 2022; Krammer et al. 2024), internationalization (Kiessling et al. 2025), and adaptation to crisis (Krammer et al. 2024).

The World Bank conducts surveys based on stratified random sampling with broad representation across countries and industries to reduce the sample selection bias while maintaining the confidentiality of the respondent firms. To enhance the reliability of the survey, WBES conducts pilot surveys across countries and follows up with the respondents to remove any inconsistent data in the final survey. Our sample primarily consisted of European and some Asian SMEs. We defined SMEs as firms with < 250 employees. Our initial sample was drawn from the 9532 SMEs reporting innovation variability during the COVID-19 survey. After merging it with the latest wave of WBES survey and removing the missing data on the key independent variable (female workforces), we had 8706 firm observations. Finally, we remove the missing values on the control variables and have a workable sample of 6900 SMEs. Supporting Information S1: Appendix A provides details of the sample preparation and Supporting Information S1: Appendix B shows the country-wise distribution of sample firms.

4.3 | Variables and Measurement

Our dependent variable was based on the firm's innovation in response to COVID-19. This measure is centered on the following question in the COVID-19 survey: "Has this establishment adjusted or converted, partially or fully, its production or the services it offers in response to the COVID-19 outbreak?" Binary variables are used—"1" for firms that adopted production and services in response to COVID-19 and "0" otherwise. It shows firms' capability to innovate (Krammer 2022) and adopt the production and services based on the learning process during external changes (Levy 1965).

4.4 | Independent and Moderating Variables

Our main independent variable was related to the female employees in the firms. Female participation in the workforce is based on the following two questions from the pre-COVID enterprise survey: "At the end of December 2019 (or 2018), how many permanent, full-time employees did this establishment employ?" and "At the end of December 2019 (2018), in this establishment how many permanent, full-time workers were female?" Based on these, we measure female workforce participation in the firms as the ratio of full-time female employees to full-time total employees.

We used three moderating variables in the study: "female CEO," "institutional development", and "gender egalitarianism

orientation in the society." First, we proposed that the influence of female labor force participation on SMEs' innovative decisions during a crisis is stronger if firms are led by female CEO. This variable is based on the following question in the WBES survey: "Is the Top Manager female?"

Female CEO is a dummy variable as "1" for firms having female CEO and "0" otherwise (Fang et al. 2023; Hewa-Wellalage et al. 2021). Prior studies show conflicting evidence that female-led firms are more resilient in a crisis (Krammer et al. 2024), whereas others show more adverse impacts (Birhanu et al. 2022).

Second, we measure the institutional development of a country based on the World Bank Governance Indicators: "rule of law, regulatory quality, political stability, government effectiveness, control of corruption and voice and accountability." These dimensions are widely used to measure formal institutional environment strength and development in cross-country settings (Alam et al. 2019; Ngobo and Fouda 2012; Tashman et al. 2019). Each dimension of the World Bank Governance Indicator is based on several subdimensions, and the aggregate scores for each dimension range from −2.5 (low quality) to 2.5 (high quality). Given the high correlation among all dimensions, we used the sum score of all six dimensions to measure the institutional quality of a country.

Third, the national cultural institutions toward females are likely to alter gender stereotypes and affect individuals' impact on firms' decisions (Seckin-Halac et al. 2021; Wang et al. 2018). We used gender egalitarianism as a measure of informal culture supporting females in a society based on the GLOBE project (House et al. 2004), which is widely used to reflect gender-related informal culture in a society or country (Seckin-Halac et al. 2021; Wang et al. 2018). The GLOBE project used five dimensions[1] to measure gender egalitarianism, reflecting the "degree to which a collective minimizes (and should minimize) gender inequality."

4.5 | Control Variables

We employed various firm, industry, and country-level controls impacting firm innovation. At the firm level, we controlled age, size, performance, concentrated ownership, CEO experience, and business group (BG) affiliation. Young firms are more flexible for changes due to their simple structure, but the experience of older firms with various internal and external structures (e.g., crisis and industry changes) provides the ability to innovate during disruptions (Huergo and Jaumandreu 2004). Firm age is measured as the natural logarithm of difference between the year of survey and incorporation (Krammer 2022). Firm size provides the advantage of resourcefulness and devoted capabilities to innovate (Krammer 2022). It is measured as the natural logarithm of the number of employees (1 year lagged to pre-COVID survey) (Krammer 2022; Krammer et al. 2024).

The better performing firms have more slack resources to reinvest in innovation activities (Lu and Wong 2019). Therefore, we control for firm performance as sales growth in the last 3 years (Yadav et al. 2022). Further, high ownership by the single largest owners increases agency conflicts and reduces managerial incentives to increase firms' innovation or risk-taking (Deng et al. 2013). It is measured as the percentage of share held by the largest single owner (Deng et al. 2013; Yadav et al. 2022, 20). Next, the experience of the managers provides the learning and network-based resources to handle the complexity and risk inherited in the innovation (Krammer 2022; Krammer et al. 2024). It is measured as the number of years the firm CEO (top manager/owner) has worked in the related industry (Birhanu et al. 2022; Krammer 2022). Additionally, we controlled for firm BG affiliation as a dummy variable as "1" for firms affiliated with a BG and "0" otherwise. BG affiliation provides network-based resources and risk-absorbing capability to take the risk of innovation (Chang et al. 2006). Furthermore, we use industry-fixed effects based on the first two digits of ISIC (The International Standard Industrial Classification of All Economic Activities) used in the WBES survey data to capture industry-specific effects (Nuruzzaman et al. 2020). Additionally, we use year and country-fixed effects to capture the time and country-specific heterogeneity impacting firms' innovation.

4.6 | Empirical Strategy

We estimated the impact of women's labor force participation in a firm on its innovation during a crisis. Given the binary nature of our dependent variable (innovation_covid), we use a logit regression model as follows:

$$\log it(Y_{i,t}) = \beta_0 + \beta_1 X_{i,\text{pre-covid}} + \beta_2 X_{i,\text{pre-covid}} \times M_{i,\text{pre-covid}} + \beta_3 M_{i,\text{pre-covid}} + C_{i,\text{pre-covid}} + \delta_c + \mu_t + \epsilon_i,$$

where $Y_{i,t}$ represents the dependent variable, which equals 1 for firms (i) innovating during the COVID-19 crisis and 0 otherwise. Our main independent variable is $X_{i,\text{pre-covid}}$, which represents the female labor force in a firm based on the pre-COVID survey. $M_{i,\text{pre-covid}}$ represents a vector of moderating variables based on the pre-COVID survey at the firm level (Female CEO) or the prior year at the country level (institutional development and gender egalitarianism). $C_{i,\text{pre-covid}}$ represents a vector of firm-level control variables based on the pre-COVID survey. It comprises firm age, size, sales growth, largest ownership, CEO experience, and BG affiliation. Furthermore, δ_c represents the country-fixed effects to control for heterogeneity at the country level. We also use year-fixed effects (2018 or 2019, based on the pre-COVID survey year) represented by μ_t.

5 | Results

Table 1 shows the descriptive statistics of the variables. Thirty-two percent of firms innovated their production or services in response to the COVID-19 outbreak. On average, the firms had 38% female employees, and 18% had a female CEO. Our cross-country sample shows a significant variation in institutional development (SD = 2.91) and gender egalitarianism (SD = 0.434). The correlation matrix shows that firm innovation positively correlates with the female employee participation ratio and BG affiliation while being negatively correlated with a

TABLE 1 | Summary statistics and correlation matrix.

	Variables	1	2	3	4	5	6	7	8	9	10	11
1	Innovation_covid	1										
2	Female_employee	0.0894***	1									
3	Female CEO	0.00854	0.269***	1								
4	Institutional development	−0.0756***	0.0792***	0.0579***	1							
5	Gender egalitarianism	−0.0848***	0.0768***	0.0808***	0.762***	1						
6	Age	−0.0523**	−0.0548**	−0.0507**	0.148***	0.0868***	1					
7	Size	0.0113	−0.0228	−0.0837***	0.0314	−0.00890	0.133***	1				
8	Sales growth	0.00960	0.0335	0.00398	−0.0483**	−0.0516**	0.0266	−0.0391*	1			
9	Largest ownership	0.0338	0.0202	−0.00471	−0.0491**	−0.0543**	−0.0699***	−0.149***	0.0147	1		
10	CEO experience	−0.0638***	−0.0429*	−0.0728***	0.292***	0.206***	0.502***	0.0342*	0.0199	−0.0609***	1	
11	BG affiliation	0.0550**	0.0644***	−0.000797	−0.0154	0.0264	0.0284	0.116***	−0.0238	−0.0833***	0.0286	1
	Mean	0.319	0.379	0.180	2.426	3.528	2.959	3.078	−5.095	79.108	22.575	0.125
	SD	0.466	0.288	0.384	2.912	0.434	0.572	1.107	57.306	25.994	11.501	0.331
	Min	0.000	0.000	0.000	−5.791	2.840	1.099	1.099	−99.102	16.000	1.000	0.000
	Max	1.000	1.000	1.000	7.299	4.080	4.382	5.513	677.778	100.000	50.000	1.000

Abbreviations: Max, maximum value of the variables; Min, minimum; SD, standard deviation.
*$p < 0.05$.
**$p < 0.01$.
***$p < 0.001$.

country's institutional development and gender egalitarianism, along with firm age and CEO experience.

Table 2 shows the results of the logit regression to predict firm innovation during a crisis. Model 1 shows that female employee participation in firms has a significant positive ($b = 0.534$, p value < 0.001) impact on the innovative response during a crisis. It supports Hypothesis 1 and shows that a 1% increase in female employee participation in firms increases the odds of innovating during a crisis by 1.70 times (exp (0.534)) or the likelihood of innovation by 63% ($p/1 - p = \exp(0.534)$, $p = 0.630$). Model 2 shows a significant positive ($b = 0.456$, p value < 0.10) interaction effect of female employee participation and female CEO on firm innovation. It supports Hypothesis 2 and shows that for firms with female CEOs, a 1% increase in female employee participation in a firm increases the odds of innovation by 1.577

TABLE 2 | Results of logit regression.

	Model 1	Model 2	Model 3	Model 4
Female_employee	0.534***	0.508***	0.195	−2.562**
	(0.125)	(0.139)	(0.167)	(1.283)
Female CEO		−0.435***		
		(0.162)		
Institutional development			−1.420	
			(2.064)	
Gender egalitarianism				0.121
				(0.202)
Female_employee × female CEO		0.456*		
		(0.258)		
Female_employee × institutional development			0.137***	
			(0.039)	
Female_employee × gender egalitarianism				0.853**
				(0.361)
Age	−0.187***	−0.178***	−0.151**	−0.104
	(0.057)	(0.058)	(0.064)	(0.077)
Size	0.079***	0.076***	0.100**	0.075
	(0.028)	(0.028)	(0.040)	(0.051)
Sales growth	−0.001**	−0.001**	−0.001**	−0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Largest ownership	0.001	0.001	0.002*	0.002
	(0.001)	(0.001)	(0.001)	(0.002)
CEO experience	0.001	0.000	−0.001	−0.001
	(0.003)	(0.003)	(0.003)	(0.004)
BG affiliation	0.145*	0.150*	0.201**	0.347***
	(0.087)	(0.087)	(0.100)	(0.116)
Constant	−0.385	−0.334	1.130	−1.227
	(0.241)	(0.242)	(2.354)	(0.788)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Observations	6900	6896	5629	3292
Log likelihood ratio	−3775.204	−3768.337	−3073.033	−1920.480
LR chi-square	1086.770***	1095.910***	913.820***	360.400***
Pseudo R-squared	0.126	0.127	0.129	0.086

Note: Standard errors in parentheses.
*$p < 0.1$.
**$p < 0.05$.
***$p < 0.01$.

times (exp (0.456)) or the likelihood of innovation by 61.2% ($p/1-p$ = exp (0.456), p = 0.612) compared to firms with male CEOs. Model 3 shows a significant positive (b = 0.137, p value < 0.01) interaction effect of female employee participation and institutional development on firm innovation. It supports Hypothesis 3 and shows that at the mean of institutional development (mean = 2.426), a 1% increase in the female employee participation rate increases the odds of innovation by 1.394 times (exp (0.137 × 2.426)) or the likelihood of innovation by 58.2% ($p/1-p$ = exp (0.137 × 2.426), p = 0.582). Model 4 shows a significant positive (b = 0.853, p value < 0.05) interaction effect of female employee participation and gender egalitarianism on firm innovation. It supports Hypothesis 4 and shows that at the mean of gender egalitarianism (mean = 3.528), a 1% increase in the female employee participation rate in a firm increases the odds of innovation by 20.26 times (exp (0.853 × 3.528) = 20.26 times) or the likelihood of innovation by 95.30% ($p/1-p$ = exp (0.853 × 3.528), p = 0.953).

5.1 | Robustness Tests—Alternative Measures of Female Control

In place of female CEO, we used several alternative measures of female control, such as female ownership. We used three proxies for female ownership: female owner (a dummy variable 1 if there is any female owner in the firms or 0 otherwise), majority female ownership (a dummy variable 1 if the majority of firm shares are held by female owners or 0 otherwise), and female ownership (percentage or share held by female owners). Table 3 shows the results using these alternative measures of female ownership and the results are consistent with Hypothesis 2.

5.2 | Alternative Measure of Institutional Development

We used the aggregate measure of institutional development in our primary analysis (Model 3, Table 3). As a robustness test, we use three alternative measures of institutional development. First, we use a dummy variable classifies countries as developed (as "1") and developing countries (as "0") based on the UNCTAD country classification. The results of the Model 1 in Table 4 are consistent for Hypothesis 3. Second, we use the individual dimensions of institutional development based on the World Bank Governance Indicators: rule of law, regulatory quality, political stability, government effectiveness, control of corruption, and voice and accountability. The results presented in Table 4 (Model 2–7) are consistent for all the dimensions and further support Hypothesis 3. Finally, given the high correlation among World Bank Governance Indicators, we develop a meta-index based on the first principal component analysis of all six dimensions (Tashman et al. 2019). The composite measure of institutional development (Institutional development (Factor)) based on the principal component has high reliability (Cronbach α = 0.948). The interaction effects based on this meta-index are consistent with Hypothesis 3 (Model 8, Table 4).

5.3 | Endogeneity Correction

We correct for the endogeneity using the Heckman two-stage procedure and the entropy balancing technique. First, our sample is biased toward firms that remained open after the COVID-19 crisis while excluding those that were permanently closed due to the crisis. Therefore, our sample does not include firms that were permanently closed due to COVID-19; consequently, we do not have observations of these firms' innovation responses to the crisis. To correct for this sample selection bias, we use the Heckman two-stage procedure (Heckman 1979). Krammer et al. (2024) argue that firms with poor conditions before COVID-19 are more likely to be closed, such as those with poor resource endowments. In the Heckman first-stage, we employ a probit model to predict a firm's propensity to close permanently due to COVID-19, using the same predictors as those in the base model presented in Table 2. The dependent variable (firm closed) is a dummy variable with a value of 1 for firms that were permanently closed due to COVID-19 and 0 otherwise. Results of the Heckman first-stage (Model 1, Table 5) show that older (b = −0.124, p value < 0.001) and larger (b = −0.174, p value < 0.001) firms are less likely to be closed, whereas firms with rapid sales growth (pre-COVID) are more likely to be closed due to the crisis. However, we do not find a significant impact of CEO experience and firm BG affiliation on propensity to close during COVID-19. It shows that business closure due to COVID-19 is an exogenous event and not dependent on the access to resources, such as CEO experience and BG affiliation. The inverse Mills ratio (IMR) is calculated from the truncated mean of the probit regression in the first stage. The IMR is included in the second-stage logit regression as a control variable to correct for the nonrandom selection of sample firms. The Heckman second stage results (Model 2–5, Table 5) are consistent with the baseline results in Table 2 (supporting all the hypotheses). The results of the Heckman second stage are also consistent with the alternative measures of the moderating variables (Supporting Information S1: Appendix C).

Second, we use the entropy balancing method to correct bias due to sample selection and omitted variables. Entropy balancing is a multivariate reweighting method of creating the weighted balanced sample of treatment and control groups to estimate treatment effects (Hainmueller 2012). It reduces the unobserved confounding biases by having a similar distribution of the treatment and control groups based on the set of pre-treatment covariates. First, we define the control and treatment groups based on the independent variable's median value (0.318) (Female_employee). The firms in the treatment group have female workforce participation above the median (0.318), and those in the control group have female workforce participation below the median (0.318). In the first stage of entropy balancing, we use the complete set of covariates from our base analysis to create a weighted balance matched sample of treatment and control groups (using the "ebalance" command in STATA17). As a common support check for entropy balancing, we confirm whether the covariates of the treatment and control groups overlap in a region, ensuring that no unreasonable weights are assigned to the control group to create a matching sample with the treated group. Table 6 presents the covariate balance summary for the treated and control groups, both before and after weighting, based on the mean, variance, and skewness

TABLE 3 | Results of logit regression: Alternative measures of female ownership.

	Model 1	Model 2	Model 3
Female_employee	0.338**	0.462***	0.378
	(0.155)	(0.135)	(0.342)
Female owner	−0.284***		
	(0.108)		
Majority female ownership		−0.354*	
		(0.182)	
Female ownership			−0.005
			(0.003)
Female_employee × female owner	0.518**		
	(0.205)		
Female_employee × majority female ownership		0.601**	
		(0.285)	
Female_employee × female ownership			0.008*
			(0.005)
Age	−0.172***	−0.172***	−0.205**
	(0.058)	(0.058)	(0.094)
Size	0.083***	0.083***	0.153***
	(0.028)	(0.028)	(0.048)
Sales growth	−0.001**	−0.001**	−0.003**
	(0.001)	(0.001)	(0.001)
Largest ownership	0.001	0.001	0.002
	(0.001)	(0.001)	(0.002)
CEO experience	0.001	0.000	0.001
	(0.003)	(0.003)	(0.005)
BG affiliation	0.157*	0.152*	0.282**
	(0.087)	(0.088)	(0.138)
Constant	−0.280	−0.331	−0.411
	(0.247)	(0.244)	(0.416)
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Observations	6854	6804	2530
Log likelihood ratio	−3744.198	−3715.330	−1395.309
LR chi-square	1090.68***	1088.77***	425.50***
Pseudo *R*-squared	0.127	0.128	0.132

Note: Standard errors in parentheses.
*$p < 0.1$.
**$p < 0.05$.
***$p < 0.01$.

of the covariates. It shows the significant difference in various covariates before weighting (i.e., sales growth, largest ownership, CEO experience, and BG affiliation), which is balanced in the weighted sample. For instance, the difference in the standardized means of the covariates between the treatment and control groups is not statistically significant after reweighting (Table 6, *p*-value> 0.05 for all covariates). To satisfy the overlap and common support assumptions, Figure 2 illustrates substantial overlap in the kernel densities of the propensity scores for the treatment and control groups before and after reweighing. In the second stage, we run the logit regression on the weighted sample and find consistent results for all the hypotheses (see Table 7). The results of the second stage logit regression on the weighted sample are also consistent with the alternative measures of the moderating variables (Supporting Information S1: Appendix D).

TABLE 4 | Results of logit regression: Alternative measures of institutional development.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Female_employee	0.025	0.277*	0.108	0.336**	0.239	0.430***	0.117	0.292*
	(−0.224)	(−0.163)	(−0.184)	(−0.159)	(−0.159)	(−0.143)	(−0.173)	(0.150)
Developed country	−14.409							
	(−718.012)							
Rule of law		−4.313						
		(−3.711)						
Regulatory quality			−78.928					
			(−5483.82)					
Political stability				−2.861				
				(−2.961)				
Government effectiveness					−2.459			
					(−2.87)			
Control of corruption						−4.745		
						(−3.477)		
Voice_accountability							−4.716	
							(−5.707)	
Female_employee × developed country	0.737***							
	(−0.255)							
Female_employee × rule of law		0.626***						
		(−0.217)						
Female_employee × regulatory quality			0.746***					
			(−0.216)					
Female_employee × political stability				0.526**				
				(−0.213)				
Female_employee × government effectiveness					0.704***			
					(−0.194)			
Female_employee × control of corruption						0.533**		
						(−0.207)		
Female_employee × voice_accountability							0.854***	
							(−0.215)	

(Continues)

TABLE 4 | (Continued)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Institutional development (factor)								−0.013
								(0.100)
Female_employee × institutional development (factor)								0.373***
								(0.129)
Age	−0.148**	−0.152**	−0.151**	−0.150**	−0.152**	−0.152**	−0.147**	−0.186***
	(−0.064)	(−0.064)	(−0.064)	(−0.064)	(−0.064)	(−0.064)	(−0.064)	(0.057)
Size	0.099**	0.099**	0.101**	0.099**	0.099**	0.099**	0.101**	0.102***
	(−0.04)	(−0.04)	(−0.04)	(−0.04)	(−0.04)	(−0.04)	(−0.04)	(0.031)
Sales growth	−0.001**	−0.001**	−0.001**	−0.001**	−0.001**	−0.001**	−0.001**	−0.001**
	(−0.001)	(−0.001)	(−0.001)	(−0.001)	(−0.001)	(−0.001)	(−0.001)	(0.001)
Largest ownership	0.002*	0.002*	0.002	0.002*	0.002*	0.002	0.002*	0.001
	(−0.001)	(−0.001)	(−0.001)	(−0.001)	(−0.001)	(−0.001)	(−0.001)	(0.001)
CEO experience	−0.002	−0.001	−0.001	−0.002	−0.001	−0.001	−0.001	0.001
	(−0.003)	(−0.003)	(−0.003)	(−0.003)	(−0.003)	(−0.003)	(−0.003)	(0.003)
BG affiliation	0.197**	0.203**	0.206**	0.203**	0.197**	0.205**	0.196*	0.145*
	(−0.1)	(−0.1)	(−0.1)	(−0.1)	(−0.1)	(−0.1)	(−0.1)	(0.087)
Constant	13.747	−0.102	18.356	−0.666*	0.264	−1.123**	2.693	−0.413
	(−718.012)	(−0.416)	(−1306.25)	(−0.357)	(−0.943)	(−0.556)	(−4.055)	(0.255)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5629	5629	5629	5629	5629	5629	5629	5629
Log likelihood ratio	−3075.593	−3075.231	−3073.205	−3077.117	−3074.025	−3076.104	−3071.364	−3769.808
LR chi-square	908.7***	909.4***	913.5***	905.7***	911.8***	907.7***	917.2***	1097.6***
Pseudo *R*-squared	0.129	0.129	0.129	0.128	0.129	0.129	0.130	0.127

Note: Standard errors in parentheses.
*$p < 0.1$.
**$p < 0.05$.
***$p < 0.01$.

TABLE 5 | Heckman two-stage analysis.

	Heckman first-stage	Heckman second-stage			
	Probit regression	Logit regression			
	Dependent = firm closed	Dependent = innovation_covid			
	Model 1	Model 2	Model 3	Model 4	Model 5
Female_employee		0.545***	0.517***	0.208	−2.413*
		(0.125)	(0.139)	(0.168)	(1.293)
Female CEO			−0.433***		
			(0.163)		
Institutional development				−1.418	
				(2.067)	
Gender egalitarianism					4.357
					(2.692)
Female_employee × female CEO			0.458*		
			(0.259)		
Female_employee × institutional development				0.141***	
				(0.039)	
Female_employee × gender egalitarianism					0.818**
					(0.364)
Age	−0.124***	0.179	0.158	−0.024	0.255
	(0.044)	(0.175)	(0.175)	(0.197)	(0.241)
Size	−0.174***	0.597**	0.552**	0.278	0.585*
	(0.023)	(0.236)	(0.237)	(0.268)	(0.329)
Sales growth	0.001***	−0.004***	−0.003***	−0.002	−0.002
	(0.000)	(0.001)	(0.001)	(0.001)	(0.002)
Largest ownership	0.001	−0.001	−0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
CEO experience	−0.001	0.003	0.002	−0.001	0.001
	(0.002)	(0.003)	(0.003)	(0.003)	(0.004)
BG affiliation	−0.005	0.173**	0.178**	0.214**	0.377***
	(0.079)	(0.087)	(0.087)	(0.101)	(0.117)
IMR		−3.523**	−3.242**	−1.250	−3.572
		(1.582)	(1.585)	(1.798)	(2.239)
Constant	−0.987***	4.937**	4.568*	3.039	−9.296*
	(0.201)	(2.397)	(2.402)	(3.591)	(5.262)
Year FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes
Observations	7752	6837	6834	5581	3255
Log likelihood ratio	−2026.62	−3745.27	−3739.21	−3053.28	−1903.62
LR chi-square	803.32***	1075.48***	1083.77***	904.18***	354.26***
Pseudo *R*-squared	0.1654	0.126	0.127	0.129	0.085

Note: Standard errors in parentheses.
*$p < 0.1$.
**$p < 0.05$.
***$p < 0.01$.

TABLE 6 | Covariate balance summary.

Treated	4027
Control	4006

Before: Without weighting

	Treat			Control		
	Mean	**Variance**	**Skewness**	**Mean**	**Variance**	**Skewness**
Age	2.958	0.323	−0.245	2.974	0.334	−0.240
Size	3.104	1.319	0.345	3.085	1.151	0.412
Sales growth	−4.147	3191.000	7.812	−6.018	3401.000	7.287
Largest ownership	79.260	686.800	−0.767	78.850	665.000	−0.698
CEO experience	21.990	126.700	0.419	23.300	135.800	0.394
BG affiliation	0.144	0.123	2.031	0.108	0.096	2.529

After: With weighting

	Treat			Control			*t*-test (mean)	
	Mean	**Variance**	**Skewness**	**Mean**	**Variance**	**Skewness**	***t*-stat**	***p* value**
Age	2.958	0.323	−0.245	2.958	0.321	−0.262	−0.800	0.422
Size	3.104	1.319	0.345	3.105	1.176	0.389	−0.190	0.853
Sales growth	−4.147	3191.000	7.812	−4.146	4086.000	7.403	0.240	0.813
Largest ownership	79.260	686.800	−0.767	79.260	684.500	−0.739	1.790	0.073
CEO experience	21.990	126.700	0.419	21.990	128.100	0.446	−0.610	0.539
BG affiliation	0.144	0.123	2.031	0.144	0.123	2.031	−0.820	0.414

6 | Discussion: Reconfiguring Innovation Through a Feminist Lens

Marketplace crises do not create inequalities but rather act as a mechanism exposing gender knowledge regimes (Jones et al. 2019) and the underlying women's labor subjectivity (Guerra-Arrau and Stecher 2025) that are often obscured during periods of relative stability. Our findings offer a significant departure from the essentialist assumptions that have historically dominated the SME and innovation literature. By demonstrating that the presence of women (both in the workforce [H1] and in leadership [H2]) positively impacts innovation during a crisis, this study highlights the relational and performative nature of organizational resilience. The support for H1 and H2 suggests that a business crisis acts as a catalyst for undoing traditional gender scripts. Although the ideal innovator is typically coded as a masculine, individualistic risk-taker (Proudfoot et al. 2015), our data shows that under conditions of extreme disruption, this archetype is not superior.

During instability caused by a crisis, firms with high female representation are better positioned to pivot toward relational innovation; a process-oriented, collaborative form of problem-solving that has previously been marginalized (Al-Asfahani et al. 2024). Rather than being a result of female traits, this success reflects a shift in the organizational substructure. When a company's leader is a woman with many women employees, she does not feel the need to sabotage other women or act like a man just to be respected. Instead of being guarded and competitive, the culture becomes one where everyone feels safe to speak up (Eibl et al. 2020; Derks et al. 2016).

The moderation effects of institutional development (H3) and gender egalitarianism (H4) confirm that innovation is not an isolated variable (Rodriguez et al. 2016). Our results indicate that formal regulatory frameworks and informal cultural norms act as macro-level inequality regimes that dictate the rules of the game. In high-quality institutional environments, the country provides laws and regulations that protect women from informal masculine dominance. This legitimizes women's participation and ensures that their innovative outputs are recognized and rewarded rather than ignored (Brush et al. 2022). Cultural egalitarianism provides the performative intelligibility necessary for women to enact leadership and innovation without professional penalty. In low-egalitarian contexts, the masculine coding of innovation remains so rigid that even a high female presence may struggle to translate their labor into formal innovation (Kuran and Khabbaz 2026).

6.1 | Limitations

This study has several limitations that should be noted. First, the definition of SMEs varies widely across countries and institutions, and there is no single global standard. Although this is a challenge for any cross-country research, our use of established international data helps to minimize this difficulty. Second, although our sample covers SMEs from 25 countries, this breadth also limits our ability to capture the distinctive institutional and cultural features of specific regions. Some regions, including Africa, Asia, and South America, are not represented, which constrains the diversity of contexts examined. Third, the study provides a single snapshot from the early wave of the COVID-19 crisis. Although

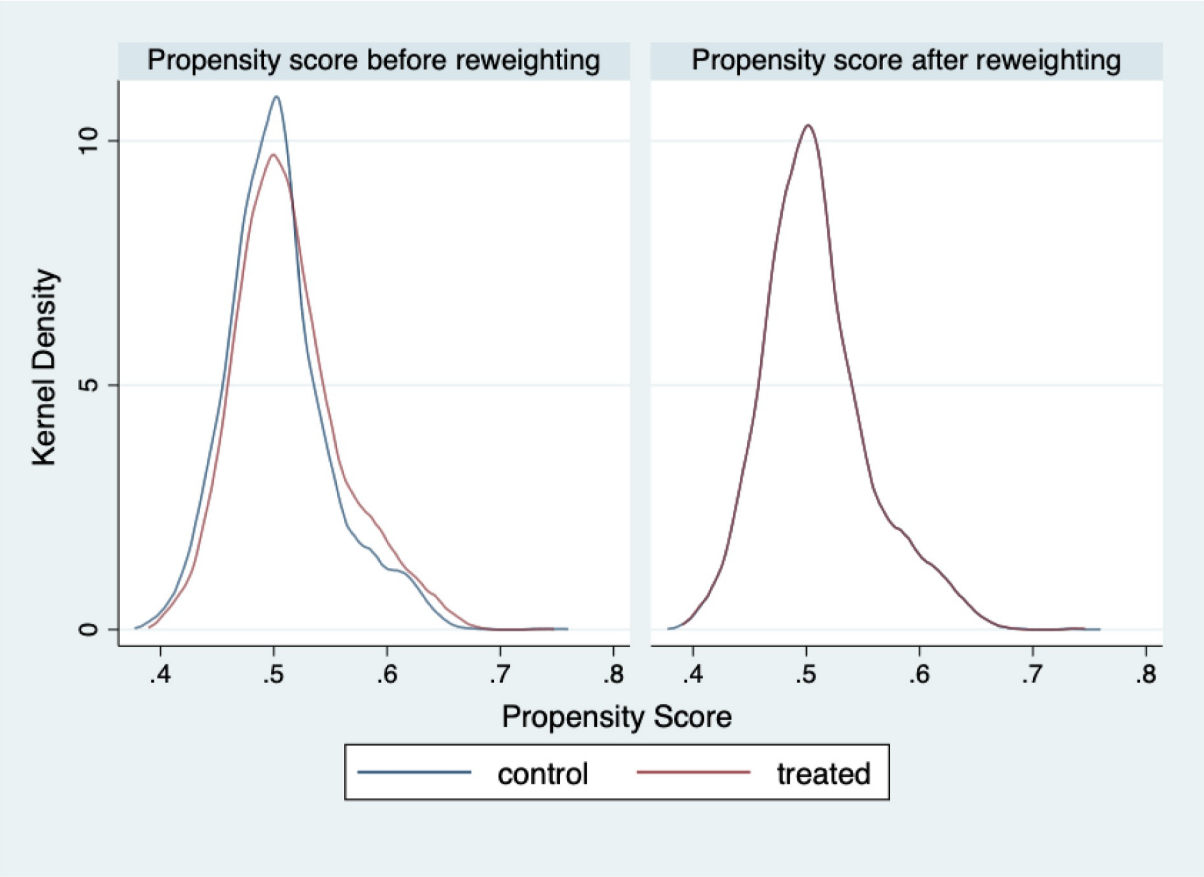

FIGURE 2 | Kernel density of propensity scores.

this timing offers a valuable view of crisis dynamics, it does not capture how gender roles and innovation might change as the situation evolves or in different types of crises.

6.2 | Future Studies

Although our study provides robust evidence for the relational and institutional drivers of gendered innovation in SMEs, it simultaneously illuminates several avenues for future critical inquiry. To advance the gendered organizations framework within the SME sector, future scholarship should move beyond the binary of female presence to investigate the granular, intersectional, and material dimensions of organizational resilience. Although this study accounts for female representation and leadership, future research must adopt a more nuanced intersectional lens (Vershinina et al. 2020; Watson 2025). Women are not a monolithic category; their innovative enactments are simultaneously shaped by race, class, migration status, and age. Future studies should investigate how these overlapping identities interact with national inequality regimes to facilitate or hinder professional legitimacy. Research is needed to explore how women from marginalized ethnic backgrounds navigate gendered institutional spaces during crises compared to their counterparts in dominant social groups.

Our data capture innovation as a performative adjustment during the acute phase of a systemic shock. However, a critical question remains: do these moments of discursive instability lead to a permanent undoing of gendered hierarchies, or do organizations regress to masculinized command-and-control scripts once the crisis subsides? Future longitudinal studies should examine the durability of these relational shifts, determining whether the inclusive innovation practices adopted during the COVID-19 pandemic have been institutionalized or merely treated as temporary, feminized crisis interventions.

7 | Conclusion

This research makes a decisive move beyond past theories such as social role theory, which reinforces the essentialist logic that "women are X" and "men are Y." Instead, we provide empirical evidence that gendered outcomes in SMEs are the product of dynamic, relational processes embedded in institutional power.

Theoretically, we advance the gendered organizations framework by showing how crisis can destabilize entrenched inequality regimes, allowing for a metamorphosis of the organizational fabric. We contribute to the emerging feminist literature (e.g., Rydström 2025) by identifying the specific conditions (relational, leadership-driven, and institutional) that allow for the undoing of gender in innovation.

Practically, our study suggests that SMEs should not view women's participation as a temporary crisis intervention or a source of feminine empathy. Instead, they must recognize that

TABLE 7 | Results of logit regression: Weighted sample.

	Model 1	Model 2	Model 3	Model 4
Female_employee	0.478***	0.458***	0.159	−3.452**
	(0.160)	(0.176)	(0.219)	(1.697)
Female CEO		−0.342		
		(0.285)		
Institutional development			−1.974***	
			(0.510)	
Gender egalitarianism				0.010
				(0.312)
Female_employee × female CEO		0.360*		
		(0.259)		
Female_employee × institutional development			0.133**	
			(0.054)	
Female_employee × gender egalitarianism				1.087**
				(0.482)
Age	−0.160*	−0.152*	−0.130	−0.079
	(0.087)	(0.087)	(0.096)	(0.118)
Size	0.047	0.044	0.036	0.010
	(0.042)	(0.042)	(0.059)	(0.074)
Sales growth	−0.001	−0.001	−0.001	−0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Largest ownership	0.000	0.000	0.001	0.002
	(0.002)	(0.002)	(0.002)	(0.002)
CEO experience	0.001	0.001	−0.002	0.001
	(0.004)	(0.005)	(0.005)	(0.006)
BG affiliation	0.340***	0.351***	0.457***	0.585***
	(0.127)	(0.127)	(0.144)	(0.164)
Constant	−0.317	−0.287	1.972***	−0.554
	(0.359)	(0.361)	(0.718)	(1.145)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Observations	6900	6896	5629	3292
F-statistics	7.79***	7.55***	6.52***	4.42***

Note: Standard errors in parentheses.
*$p < 0.1$.
**$p < 0.05$.
***$p < 0.01$.

innovation is a gendered construct and that diversifying the workforce is not enough, as firms must dismantle the masculinized hierarchies that stifle process-based and collaborative innovation. Also, resilience is intersectional as sustainable competitive advantage is achieved when formal policies (IR laws) and informal culture (egalitarianism) converge to protect and legitimize diverse contributions.

This research illustrates that the gender-innovation gap is not a gap in capability but a gap in institutional legitimacy. By treating gender as a relational and performative process, SMEs can move beyond the essentialist trap and build more resilient, innovative, and equitable organizations in an age of permanent disruption.

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Endnotes

[1] The five dimensions of gender egalitarianism are (1) In this society, boys are encouraged more than girls to attain a higher education (strongly agree: 1; strongly disagree: 7), (2) in this society, there is more emphasis on athletic programs for (boys: 1; girls: 7), (3) in this society, it is worse for a boy to fail in school than for a girl to fail in school (strongly agree: 1; strongly disagree: 7), (4) in this society, people are generally (physical: 1; nonphysical: 7), and (5) in this society, who is more likely to serve in a position of high office (men: 1; women: 7)?

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Supporting Information

Additional supporting information can be found online in the Supporting Information section.

Supporting Information S1: gwao70124-sup-0001-suppl-data.docx.