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Women's entrepreneurship and resilience: Focusing on a Central European entrepreneurial setting

Abstract

Purpose: Despite extensive research on resilience in established organizations, scholarship intersecting entrepreneurial resilience and women's entrepreneurship has been slow to progress. Much of the academic discourse within this research stream often centres on women's negative experiences in male-dominated entrepreneurial environments. In contrast, this study investigates the underlying mechanisms of women entrepreneurs' capabilities that foster resilience in business ventures that are geographically dispersed across three Central European countries, including Germany, Poland, and Slovakia.

Design/methodology/approach: This empirical study adopts a quantitative research approach. Specifically, it utilises an entrepreneurship-resilience-capabilities conceptual overlay and structural equation modelling techniques to analyse 1,113 observations of Central European women entrepreneurs.

Findings: The empirical findings of this study demonstrate how feminine role identity fosters resilience among women entrepreneurs in Germany, Poland, and Slovakia. Notably, these results highlight a dual interplay, illustrating that resilience is amplified by women's sensing and seizing capabilities, whereas reconfiguring capabilities attenuate this association. Within this framework, women's resilience is indirectly enhanced by their digital capabilities through their influence on dynamic capabilities.

Originality: The originality of this study lies in its characterization of women's entrepreneurial resilience, elucidating the complex mechanisms within the relationships that support the interplay of sensing, seizing, and reconfiguring capabilities. In this regard, the study develops novel theoretical insights that intersect a women's entrepreneurship-resilience nexus in a Central European entrepreneurial setting. This understanding yields significant academic, policy, and social implications.

Keywords: resilience; women's entrepreneurship; digital capabilities, dynamic capabilities; feminine roles

Introduction

Existing research highlights how the vulnerabilities of entrepreneurial ventures and small businesses are exacerbated by disruptive events, such as pandemics, natural disasters, and geopolitical shocks (Smith *et al.*, 2022). Given that these events are typically sudden, pervasive, and highly destabilizing, academic, policy, and economic discourses naturally pivot toward the strategies entrepreneurs must employ to navigate such adversity (Shepherd *et al.*, 2020; Yu *et al.*, 2024). For example, during the peak of supply chain disruptions caused by the 2022 pandemic, economic, political, and social debates focused on fostering resilience within small businesses, as they were recognized as the most severely affected economic agents (Ojong and Simba, 2026). Recent scholarly work (e.g., Liu *et al.,* 2026) suggests that disruptive adversities simultaneously stimulate capability

renewal, trigger survival instincts, and activate resilience. Building on this body of knowledge, this empirical study focuses on the notion of entrepreneurial resilience in small, women-owned business ventures geographically dispersed across the Central European countries of Germany, Poland, and Slovakia.

Theoretically, the study develops and uses a grounded entrepreneurship-resilience-capabilities conceptual overlay and structural equation modelling techniques to examine entrepreneurial resilience among these Central European women entrepreneurs. The overarching goal is to develop theoretical insights that shed light on the mechanisms underpinning these women's entrepreneurial resilience (Doern, 2016). In this context, entrepreneurial resilience is conceptualised as a set of cognitive and emotional, action-oriented capabilities that entrepreneurs confronting a confluence of adversities draw upon (Bullough and Renko, 2017). Considering that scholarly research on resilience in SMEs primarily emphasises psychological dimensions of resources and coping strategies (Liyanagamage *et al.*, 2024), focusing on women's entrepreneurial resilience, as this study does, provides theoretical insights into women's entrepreneurs' cognitive and emotional, action-oriented capabilities. Considering that women entrepreneurs grapple with multiple challenges, including entrenched gender norms (Wettermark and Berglund, 2025), societal biases (Li, 2024), and discrimination (Marlow and Martinez Dy, 2018), developing an understanding of the capabilities they draw upon when facing multiple, intersecting crises enriches entrepreneurship research. To achieve this research endeavour, the following question guides this inquiry:

What are the specific configurations of the mechanisms that underpin the capabilities of Central European women entrepreneurs confronting multiple crises, and how do these capabilities relate to entrepreneurial resilience?

To meet the requirements of this phenomenon-theory-driven question, this study focuses on three Central European countries including Germany, Poland, and Slovakia. The characteristics of their economic and social structures provide suitable research settings needed to address the requirements

of the research question above. Indeed, the Central European region remains exposed to disruptions, including the pandemic, regional conflicts, supply chain bottlenecks, energy price hikes, inflation, and geopolitical uncertainty (cf. Cotterell *et al.,* 2026). Focusing on women's entrepreneurship, scripted in a context characterised by the confluence of the legacy of a disruptive pandemic (Działek *et al.*, 2024; Ojong and Simba, 2026) and long-standing gender issues in Europe (Marlow and Martinez Dy, 2018), becomes important as it contributes to research in the following major ways.

First, the study establishes and contributes to a theoretically-grounded interface between entrepreneurship, resilience, and capabilities (cf. Donaldson *et al.,* 2026). Its theoretical framework and perspectives delineate the specific entrepreneurial resilience attributes of women entrepreneurs during a protracted crisis (cf. Herbane, 2013). In particular, the findings offer theorizations that articulate a dual interplay: demonstrating how resilience reinforces sensing and seizing capabilities, while reconfiguring capabilities attenuate this connection in women's entrepreneurship. The study advances a novel pathway for understanding women's entrepreneurship by integrating capability-based perspectives, including digital and dynamic capabilities, with gender-oriented perspectives that highlight how feminine roles collectively interact with these capabilities to strengthen resilience.

Secondly, the empirical findings of this study offer significant practical and theoretical implications. Rather than viewing resilience as a static trait, they demonstrate how feminine role identity serves as a strategic asset, strengthening the impact of digital collaboration and dynamic capabilities in managing uncertainty. Furthermore, by framing resilience as socially and structurally embedded, this research advances new theoretical pathways, informs policy development, and provides actionable insights for cultivating inclusive entrepreneurial ecosystems.

Theoretical argument

Against the backdrop of increasing uncertainty, entrepreneurial resilience is increasingly used to understand how entrepreneurs sustain and adapt their ventures over time. Research conceptualises resilience as a dynamic personal resource enabling individuals to recover from adversity, adapt to

changing conditions, and learn from challenging experiences (Stephens et al., 2013). In this philosophical debate, psychologists and management researchers view resilience not merely as endurance during adversity but also as the ability to adapt and recover from uncertainty, change, and disruption, including situations presenting both opportunity and risk (Matysek-Jędrych et al., 2024). In this context, resilience links to individual efforts to protect, mobilise, and replenish valued assets like motivation and commitment, especially under heightened strain and resource depletion (Lu et al., 2022).

Research elsewhere conceptualises the entrepreneurship-resilience link as an indirect, multilevel process where individual resilience boosts entrepreneurial outcomes, including generating novel ideas or developing disruptive creative behaviours (De Clercq and Pereira, 2019), reinforcing entrepreneurial success (Covin *et al.*, 2006). More resilient entrepreneurs engage more readily in opportunity-oriented and change-driven behaviours, sustain entrepreneurial orientation under strain, facilitate knowledge sharing even in demanding work contexts, and favour entrepreneurial team functionality (De Clercq and Pereira, 2024; Ng and Clercq, 2021). Entrepreneurship is a profoundly resource-draining activity. Entrepreneurs are constantly pushed to the limits of their psychological and managerial capabilities to ensure their ventures are viable. These demands intensify as environmental challenges increase, potentially becoming overwhelming in extreme settings (Parrott et al., 2025), which highlights the need to examine factors shaping entrepreneurs' resilience. These dynamics are particularly salient for women entrepreneurs, who often face additional structural, social, and relational constraints (Gaweł and Mroczek-Dąbrowska, 2022; Li, 2024; Wettermark and Berglund, 2025) which exacerbate resource depletion. Understanding women's entrepreneurial resilience involves not only individual resilience, but also organisational skills and gendered traits that help women protect, mobilise, and replenish key resources over time.

Hypotheses development

To advance this study's core arguments, the following hypotheses focus on women's entrepreneurial resilience. They explain how women's entrepreneurship in Central Europe demonstrates resilience through a complex chain of capabilities, connecting digital and dynamic capabilities with feminine roles. Furthermore, they illustrate a capability-based view of resilience, where digital capabilities serve as antecedents to the dynamic capabilities that sustain the adaptive capacity of women entrepreneurs during periods of uncertainty. Theoretically, these hypotheses integrate the resource-based view (RBV) and dynamic capabilities theory (DCT) offering novel insights into how human skills and leadership collectively enable women entrepreneurs to transform digital assets into collaboration and adaptation during adversity in a Central European setting.

Digital capabilities

Research that has focused on RBV identifies digital capabilities as multidimensional, encompassing human, technological, and collaborative elements that jointly shape the mobilisation of digital resources (Liu *et al.*, 2024; Nasiri *et al.*, 2023). In this context, digital collaboration capability represents a higher-order organisational capability that arises from the strategic integration of heterogeneous internal resources. In women's ventures, digital human capabilities, such as workforce digital skills, digitally competent leadership, and supportive employee dynamics, constitute intangible, partly tacit resources that are difficult to imitate and therefore particularly consequential for building collaboration routines (Wang *et al.*, 2022). These human resources shape how effectively digital tools are adopted, routinised, and coordinated across actors, enabling the venture to transform digital inputs into coordinated joint action rather than isolated tool use. Existing research on women entrepreneurs highlight the role of digital skills and optimism for resilience, but lacks direct, systematic tests of how digital human and technological capabilities jointly enable digital collaboration and venture resilience specifically for women entrepreneurs (Ladan and Abubakar, 2024).

Digital human capabilities enhance ventures' ability to recognise digitally mediated opportunities, interpret data and signals, and mobilise coordinated responses across teams and

partners. Human capabilities encompass knowledge, skills, readiness, and support that enable employees to advance digitalisation and convert the outputs of digital solutions into actionable innovations (Nasiri *et al.*, 2023). Therefore, women-owned ventures relying on digitally skilled leaders can activate network ties, overcome coordination frictions, and formalise routines through digital tools. These capabilities enable ventures to integrate knowledge, coordinate tasks, and adapt routines, forming the core of digital collaboration: the ability to manage collaboration through digital infrastructures. Investing in human digital capabilities offers a cost-effective path to stronger collaboration without requiring extensive technological infrastructure. Therefore, this study has the following hypothesis:

H1: *The digital human capabilities of women's entrepreneurial ventures in a Central European setting enhance their digital collaboration capabilities.*

Digital technological capabilities represent a venture's ability to deploy and integrate digital technologies, such as IT infrastructure, platforms, data architecture, analytics, and AI, into core activities and partner interfaces. When well-configured, these technology resources enable information sharing, transparency, and process connectivity across internal functions and external actors, thereby supporting the development of digital collaboration capability as an organisational routine.

From a dynamic capabilities perspective, such technology configurations strengthen collaboration by improving digitally enabled visibility and interoperability, thereby enhancing sensing (shared awareness of opportunities and constraints) and seizing (rapid coordination and execution of joint actions). At the same time, modular digital architectures lower the cost of reconfiguring collaboration processes as conditions change. This logic is particularly relevant for women-owned ventures, as women entrepreneurs often engage in more collaborative, relationship-based business cooperation (Gray *et al.*, 2024), making digital technologies an important enabler for scaling and stabilising collaboration across partners. Moreover, many women entrepreneurs operate in SMEs,

often agile enough to exploit digital innovation effectively (Nasiri *et al.*, 2023). To this end, this study has the following hypotheses.

H2: *The digital technological capabilities of women's entrepreneurial ventures in a Central European setting increase their digital collaboration capabilities.*

A digital collaboration and dynamic capabilities bridge

Existing research suggests that firms that embrace the principles of a dynamic capabilities approach (Teece *et al.*, 1997) amplify their capacity to sense and seize opportunities through iterative learning and experimentation, which constitute dynamic capabilities in their own right (Zahra, 2021; Zahra *et al.*, 2006). As a concept, dynamic capabilities can be deployed to enhance a firm's capacity to purposefully create, extend, and modify its resource base to address and shape rapidly changing business environments (Helfat *et al.*, 2007). Unlike ordinary or operational capabilities that enable a firm to perform established activities efficiently, dynamic capabilities operate at a higher order, allowing the firms to sense opportunities and threats, seize promising opportunities, and reconfigure tangible and intangible assets to maintain competitive advantage (Teece, 2007; Winter, 2003). Research shows how operational capabilities sustain current operations and generate short-term rents, while dynamic capabilities drive long-term enterprise performance by facilitating adaptive renewal and strategic flexibility in uncertain environments (Eisenhardt and Martin, 2000).

Dynamic capabilities manifest through three interrelated dimensions: sensing, seizing, and reconfiguring, which together enable firms to adapt, renew, and transform in response to environmental change (Teece, 2007). Sensing encompasses the organisational processes of scanning, searching, and exploring opportunities and threats across technologies and markets through activities such as R&D investment, market intelligence gathering, and engagement with suppliers and customers (Kump *et al.*, 2018; Teece, 2007). Seizing involves mobilising resources to capture value from sensed opportunities by designing and refining business models, making investment commitments, and

orchestrating complementary assets through decision-making routines and resource allocation mechanisms (Helfat *et al.*, 2007). Reconfiguring (or transforming) entails the continuous realignment and recombination of assets and organisational structures to maintain evolutionary fitness, i.e., activities including the divestiture of obsolete assets, integrating newly acquired resources, and the redesigning organisational routines (Kump *et al.*, 2018; Teece, 2007). The generic processes underlying DCs are observable and measurable; their effectiveness depends on firm-specific microfoundations, managerial cognition, and contextual enactment (Helfat *et al.*, 2007).

As dynamic capabilities reflect the enterprise's ability to integrate, build, and reconfigure internal and external competencies in turbulent contexts (Teece, 2016), their enactment increasingly unfolds in digital environments characterised by abundant information, accelerated feedback, and reduced coordination costs. Prior research suggests that data-driven tools and digital platforms enhance firms' ability to combine and mobilise heterogeneous resources across organisational boundaries, support experimentation, and facilitate rapid adjustment of business models and processes (Ge and Zhao, 2022; Troise *et al.*, 2023). In this sense, digital capabilities do not substitute for dynamic capabilities; rather, they shape how sensing, seizing, and reconfiguring activities are performed, particularly through digitally mediated collaboration with external actors. This perspective is especially relevant for women-owned ventures, which often rely on relational resources and flexible organisational arrangements to navigate resource constraints and environmental uncertainty.

Digital collaboration capabilities provide an important mechanism for women-led ventures to better sense emerging opportunities and threats. Prior research suggests that investments in ICT use and human ICT skills enable firms to develop adaptive and collaborative routines that facilitate inter-firm interaction, as human actors play a central role in operationalising sensing and integration processes necessary for collaborative innovation (Parida *et al.*, 2016). Through collaboration with external partners, ventures can access diverse information sources, complementary knowledge, and market signals that extend beyond organisational boundaries (Simba, 2015). In digitally intensive contexts, technologies such as analytics, artificial intelligence, and data-sharing platforms further

expand firms' capacity to process large volumes of information and detect weak signals in dynamic environments (Warner and Wäger, 2019). Accordingly, digital collaboration capabilities support opportunity identification by broadening access to information and enhancing collective sense-making within and across organisational networks. This leads to the following hypothesis:

H3: *The digital collaboration capabilities of women's entrepreneurial ventures in a Central European setting have a positive relationship with their sensing capabilities.*

Digital collaboration capabilities also enhances a venture's capacity to seize opportunities. Research on artificial intelligence highlights that human–technology collaboration, or knowledge coupling, reshapes both dynamic capabilities and collaboration practices, enabling firms to coordinate actions and mobilise resources more effectively (Shan *et al.*, 2025). In particular, AI, algorithms, and digital decision-support tools accelerate the seizing process by compressing evaluation and commitment cycles, thus supporting strategic agility and faster resource mobilisation in dynamic environments (Warner and Wäger, 2019). In women-led ventures, digital collaboration capabilities facilitate coordination with internal and external partners, enabling coordinated responses to opportunities identified through sensing processes. By linking human skills with technological tools, collaboration capabilities strengthen the venture's ability to act decisively and capture value from emerging opportunities. Against that backdrop, this study theorises that:

H4: *The digital collaboration capabilities of women's ventures in a Central European setting have a positive relationship with their seizing capabilities.*

Digital collaboration capabilities support a venture's capacity to reconfigure resources and competences in response to changing conditions. Similarly, dynamic capabilities enable business model transformation by underpinning managerial sensing and seizing, as well as the continuous reconfiguration of competences, allowing firms to implement, refine, and recombine business model elements as circumstances evolve (Teece, 2018a). In the digital economy, capturing value from innovation requires understanding platforms, ecosystems, standards, and complementary assets and

adapting the business model accordingly (Teece, 2018a, 2018b). For women-led ventures, digital collaboration capabilities facilitate the coordination of internal teams and external partners, providing the organisational routines and structures needed to reconfigure resources, processes, and business models efficiently. By linking human and technological capabilities across the network of actors, collaboration strengthens the firm's capacity for adaptive transformation. Based on this reasoning, the study offers the following hypothesis:

H5: *The digital collaboration capabilities of women's ventures in a Central European setting have a positive relationship with their reconfiguring capabilities*.

Dynamic capabilities and resilience

Research suggests that dynamic capabilities are essential for firms as they create, expand, and modify a company's resource base in response to environmental shocks (Kurtz and Varvakis, 2016). Specifically, sensing capabilities - understood as the ability to identify opportunities, interpret environmental signals, and envision future possibilities - represent a foundational element of women's entrepreneurial competence. Existing research shows that women entrepreneurs often possess strong opportunity-recognition skills, creativity, social awareness, and leadership potential; all of which are shaped by personal, social, and contextual conditions (Agarwal *et al.*, 2020). The literature also suggests a strong conceptual link between sensing capabilities and resilience.

Women who are able to effectively identify and interpret opportunities tend to display higher levels of confidence, agency, and forward-looking orientation - factors that reinforce their ability to cope with challenges and sustain entrepreneurial activity (Chatterjee *et al.*, 2022). Opportunity recognition also supports adaptation and survival during crises, as women leverage both socio-psychological resources and sensing skills to innovate and secure business continuity (García Uceda *et al.*, 2025). Moreover, entrepreneurial competence - which includes sensing - partially mediates the relationship between resilience and favourable entrepreneurial outcomes such as well-

being, indicating that sensing strengthens the beneficial effects of resilience. Given these insights, it is conceivable that women's sensing capabilities contribute to their resilience.

H6: *The sensing capabilities of women's ventures in a Central European setting are positively related to the resilience of the women entrepreneurs who own them.*

Research describes how women entrepreneurs often display strong adaptability, networking capacity, and opportunity-driven action enabling them to introduce product and process innovations even under crisis conditions (Sahi *et al.*, 2023). These seizing competencies allow women not only to generate novel ideas but also to deploy resources efficiently and respond dynamically to market shifts (Zhang *et al.*, 2025). The literature also highlights a reciprocal relationship: while resilience helps women entrepreneurs withstand and adapt to shocks, seizing capabilities enable them to convert adversity into opportunity, as demonstrated during the COVID-19 crisis when women leveraged networks and innovative responses to ensure business continuity (Sahi *et al.*, 2023). Therefore, this study makes the following assumption:

H7: *The seizing capabilities of women's ventures in a Central European setting are positively related to the resilience of the women entrepreneurs who own them.*

Finally, reconfiguring capabilities—specifically the capacity to realign resources, modify strategies, and redesign organizational processes—constitute the dynamic capabilities of women entrepreneurs, particularly within uncertain environments (Simba et al., 2025). The adaptability, networking skills, and continuous reinvention of business practices among women entrepreneurs enable them to sustain operations and pursue growth even under volatile conditions (Joussen et al., 2025). These reconfiguring capabilities manifest as several interconnected behaviors, including using social and professional networks to access critical information and resources, adjusting business models or offerings in response to shifting market demands, and introducing innovative products or processes to navigate adversity and maintain competitiveness. Moreover, women entrepreneurs frequently undertake ongoing skills development, encompassing management training and financial

literacy, which strengthens their ability to effectively restructure their business ventures (Bhardwaj et al., 2023). This strategic flexibility is highly correlated with resilience, as the ability to reconfigure capabilities enables challenges to be perceived as catalysts for reinvention rather than existential threats. By modifying operations and mobilizing support networks, women entrepreneurs can effectively navigate disruptions, adapt to change, and ensure business continuity (Bullough and Renko, 2017). Consequently, reconfiguring capabilities serves to enhance the resilience of women entrepreneurs.

H8: *The reconfiguring capabilities of women's ventures in a Central European setting are positively related to the resilience of the women entrepreneurs who own them.*

Feminine role

Previous research has numerous examples on the role of entrepreneurial individual resilience in shaping the resilient response of their companies (Leonelli *et al.*, 2025). This body of knowledge suggests that such resilience translates an entrepreneur's personal traits, capabilities, and behaviors into organizational processes, enabling their companies to adapt and recover during times of crisis. From a gendered perspective, resilience is shaped by socially constructed roles, access to resources, and cultural expectations, implying that women entrepreneurs may face distinct challenges and develop unique coping mechanisms in response to adversity (Seyfi *et al.*, 2025). Women's resilience in male-dominated fields is often undermined by internalised gender stereotypes, limited self-confidence, and exclusionary workplace cultures that privilege masculine behaviours and marginalise women's contributions (Bridges *et al.*, 2023). Occupational resilience research emphasises psychological capital, comprising resilience, hope, self-efficacy, and optimism, as a developable mindset; yet organisational approaches often privilege masculine norms of rationality, emotional detachment, and toughness as the dominant model of resilient behaviour (Bridges *et al.*, 2023; Witmer, 2019). Given that traditional organisational norms of resilience reward masculine-coded behaviours (Witmer, 2019), entrepreneurship can be a form of independent professional activity that

enables women to express and leverage feminine-associated qualities such as empathy and collaboration.

Through socialisation, women often develop protective factors such as strong communication, empathy, help-seeking, and autonomy, which enhance their emotional resilience and foster perseverance and self-reliance. One of the best-known lists of gender roles is the Bem Sex Role Inventory, which consists of 60 items (Bem, 1974). There are several short versions of these roles, with some differences depending on the national context or research sample (Colley *et al.*, 2009; Vafaei *et al.*, 2014), also used in the entrepreneurship research (Golik and Wasilczuk, 2025), with examples of feminine roles such as affectionate, understanding, compassionate, gentle, warm etc. Such role-related strengths can support the building of social capital, foster trust, and sustain networks, which can translate into proactive coping, collective problem-solving, and a long-term orientation. In fact, women entrepreneurs develop their social resilience, employ emotion-based coping strategies to strengthen their entrepreneurial resilience, and reduce their employees' emotional tensions, motivating them to persevere through the crisis (Bagheri *et al.*, 2024). Against this backdrop, the following hypothesis is formulated.

H9: *The feminine roles adopted by women entrepreneurs within entrepreneurial ventures in a Central European setting exert a positive influence on their resilience.*

Conceptual model

The conceptual model linking all assumed relationships developed in the hypotheses section above is presented in Figure 1.

- Insert Figure about here -

Research approach

Preparation procedures

The measurement items were initially developed and reviewed in English, the primary working language of the international research team and the source language for established constructs from

previously validated scales. Any adaptations made to these scales to suit the specific research context were discussed and approved by the team prior to translation. The final English version was translated into German, Polish, and Slovak using translation software, followed by back-translation into English to ensure consistency with the source text. These versions were then reviewed by native speakers, including both research team members and independent reviewers, to ensure linguistic clarity, contextual relevance, and conceptual equivalence. Finally, the translated questionnaires were integrated into the survey platforms of market research agencies and underwent a final round of testing by the research team. Any issues identified during this stage were resolved before data collection commenced.

Data collection and key constructs

The questionnaire was based on latent variables validated and used in previous studies. The scale of resilience of women entrepreneurs was developed using five statements (i.e., "*I am getting better at running my business because I learn from my mistakes*") based on Stephens et al. (2013), similar to other studies (De Clercq and Pereira, 2019). Digital capabilities were presented through human, collaboration, and technological dimensions and conceptualised in the work of Nasiri et al. (2023), also explored in other studies (Liu *et al.*, 2024). The construct of human digital capabilities consisted of three items (i.e., "*Digital skills development is supported and promoted in my company"*), three items also reflected the collaboration digital capabilities (i.e., "*While running my business, I/we engage in digital cooperation with other companies"*), while four items reflected the technical digital capabilities (i.e., "*Digitalism increases the value of products or services offered by my business"*). Dynamic capabilities were reflected by their three dimensions: sensing, seizing, and reconfiguring capabilities, developed in the work of Wilden et al. (2013), rooted in the study of Teece (2007), and also explored in other studies (Nguyen *et al.*, 2023). The sensing capabilities were conceptualised based on three items (i.e., "*I/we identify target market segments, changing customer needs, and*

customer innovation"), seizing capabilities on four items (i.e., "*I/we invest in finding solutions for our customers"*), and reconfiguring capabilities also on four items (i.e., "*I/we annually implement new management methods"*).

To create a construct of the feminine role, a shortened version of Bem's sex role inventories (Bem, 1974) was incorporated, similar to other studies (Vafaei *et al.*, 2014), including the context of entrepreneurship research (Golik and Wasilczuk, 2025). Five features were included: warm, affectionate, sympathetic, sensitive to others' needs, and tender. A 5-point Likert scale was used to assess resilience as well as digital and dynamic capabilities, with respondents indicating their level of agreement with each item, where "1" denotes "completely disagree" and "5" denotes "completely agree." For the feminine role inventory, respondents evaluated how well each characteristic described them using a 5-point Likert scale ranging from "1" ("not at all") to "5" ("very well").

The questionnaire also included questions about respondents' personal and professional characteristics, such as age, education level, family situation, specifically whether they are married or in a partnership, and whether they have children, and years of entrepreneurial experience. The empirical verification of the conceptual model was based on primary data collected from women entrepreneurs in three Central European states: Germany, Poland, and Slovakia, all member states of the European Union (EU). Their shared membership in the EU and geographic proximity provide a comparable institutional framework for the study, while allowing for contrasts of varying levels of economic development and entrepreneurial ecosystem maturity: Germany as a highly developed economy, Poland as the largest economy in Central and Eastern Europe, and Slovakia as a smaller yet dynamic market. As data from Eurostat, the European Union statistical office, shows[1], there are

[1] Based on database: Self-employment by sex, age and citizenship (1 000) [lfsa_esgan__custom_17982180], access: 08/09/2025.

differences in gender aspects of entrepreneurship in these countries. In 2024, women aged 20-64 years represented 33.7% of all entrepreneurs in Germany, 32.0% in Poland, and only 24.1% in Slovakia.

To ensure accessibility and reliability, the survey questionnaire was translated into the respective national languages and distributed through two professional market research agencies covering Poland, Germany, and Slovakia. The agencies were selected based on the applicable public procurement procedures, including compliance with relevant ethical requirements, prior experience in conducting survey research, and access to the target respondent population. Data collection was conducted using two self-administered online survey platforms established by research agencies to recruit respondents and administer the survey to a randomly selected sample of women entrepreneurs.

Sampling frame

Women who operated businesses or owned/co-owned ventures in Poland, Germany, and Slovakia were eligible for this study. Respondent eligibility was determined through self-reported screening at the beginning of the questionnaire, using specific questions regarding gender, current entrepreneurial involvement, and country of operation. Only respondents meeting all criteria proceeded to the main survey. The research team provided agencies with country-specific quotas of at least 300 respondents per country, applying predefined eligibility and exclusion criteria to manage response variation. This approach ensured consistency across target countries while minimizing potential biases related to language barriers or survey administration. Consequently, 1,135 pre-screened responses were collected and subjected to further data-quality checks. Following this additional screening, 22 responses were excluded due to a lack of variation, which indicated insufficient engagement. This yielded a final sample of 1,113 respondents: 391 from Germany (35.1%),

303 from Poland (27.2%), and 419 from Slovakia (37.7%). Detailed respondent profiles are presented in Table 1.

- Insert Table 1 about here -

Research results

Measurement model

The structural equation modelling was used to verify the conceptual model based on responses from surveyed women entrepreneurs. However, as there are two approaches of using PLS-SEM or CB-SEM, we chose CB-SEM due to the several criteria. Given that our study aims to rigorously test and confirm theoretically derived relationships between digital capabilities, collaboration, dynamic capabilities, and resilience in women-owned ventures, and the sample size is sufficient for model estimation, covariance-based SEM (CB-SEM) is the appropriate choice, as it is well suited for theory confirmation and hypothesis testing when a relatively big sample size of respondents is available (Hair *et al.*, 2020). Our approach aligns with other research in entrepreneurship and organisational resilience (Arıkan *et al.*, 2025; Leonelli *et al.*, 2025). The measurement model was first evaluated to ensure that the constructs applied were both reliable and valid (Table 2). All factor loadings were statistically significant and exceeded the recommended threshold of 0.6, ranging from 0.674 to 0.854, indicating strong indicator reliability. Internal consistency was confirmed, with Cronbach's α values ranging from 0.755 to 0.878 across the dimensions and McDonald's ω coefficients between 0.753 and 0.879, all exceeding the recommended threshold of 0.7. Composite reliability (CR) scores were also satisfactory, ranging from 0.755 to 0.879 and exceeding the threshold of 0.7. Convergent validity was established, as the average variance extracted (AVE) values for each construct were between 0.509 and 0.644, surpassing the minimum of 0.5 (Fornell and Larcker, 1981). These results indicate that the measurement model demonstrates robust reliability and validity (Dash and Paul, 2021; Steenkamp and Baumgartner, 2000), providing a sound foundation for the subsequent structural analysis.

- Insert Table 2 about here -

Discriminant validity was further assessed using the Heterotrait–Monotrait (HTMT) ratio of correlations (Table 3). All HTMT values were below the threshold of 0.90 (maximum = 0.893), confirming that the constructs are empirically distinct from one another.

- Insert Table 3 about here -

The measurement model demonstrated a satisfactory fit to the data (Dash and Paul, 2021; Steenkamp and Baumgartner, 2000), with both Comparative Fit Index (CFI=0.945) and Tucker–Lewis Index (TLI=0.937) exceeding the acceptable cutoff value of 0.90, indicating strong incremental fit. The Root Mean Square Error of Approximation (RMSEA=0.046) and the Standardised Root Mean Square Residual (SRMR=0.042) were below the commonly accepted limit of 0.08, further confirming that the model adequately captures the relationships among the constructs.

Given that the sample comprised women entrepreneurs from Germany, Poland, and Slovakia, we conducted a multi-group confirmatory factor analysis (MGCFA) to assess whether the measurement model operated equivalently across the three national subsamples. The configural model demonstrated acceptable fit (CFI = 0.927, TLI = 0.916, RMSEA = 0.055, SRMR = 0.052), supporting the same underlying factor structure across countries. We subsequently tested metric invariance by constraining the factor loadings to equality across the three countries. The comparison with the configural model revealed negligible changes in fit (ΔCFI = 0.001, ΔRMSEA = 0.001, ΔSRMR = 0.003), supporting metric invariance. Thus, the latent constructs were measured with sufficiently comparable factor loadings across Germany, Poland, and Slovakia, allowing the structural relationships among the constructs to be meaningfully examined in the pooled sample. As the purpose of the study was not to compare latent construct means across countries, scalar invariance was not required for the primary analysis.

To address potential common method bias (CMB), we employed both procedural and statistical remedies. Procedurally, the study used established multi-item measures, carefully adapted

and translated scales with neutral language of items, questionnaire pretesting, and respondent anonymity to reduce potential method-related biases. Statistically, Harman's single-factor test was conducted Harman's single-factor test was conducted using an unrotated factor solution, and the results showed that the first single factor accounted for 34.6% of the total variance, which is below the commonly used 50% threshold (Dash and Paul, 2021). Next, we estimated a common latent factor (CLF) model and introduced it at the measurement level, loading it on all observed indicators. The comparison of the measurement model with and without the CLF showed moderate improvements in model fit (ΔCFI = 0.025, ΔTLI = 0.026, ΔRMSEA = −0.010, and ΔSRMR = −0.015).

Furthermore, the inclusion of the common latent factor resulted in only limited changes in the substantive factor loadings of the measurement model. Across the 31 observed indicators, the mean absolute change in standardised loadings was approximately 0.05, with the largest absolute change being 0.145. All changes remained below 0.20, and 29 of the 31 loadings changed by less than 0.10. Following the criterion applied in prior studies, these results suggest that common method variance does not substantially alter the measurement properties of the constructs. Therefore, the common method bias is not a significant issue in the study.

Structural model

As the measurement model demonstrated reliability, validity, and overall goodness of fit, confirming the robustness of the constructs and meeting commonly accepted criteria (Dash and Paul, 2021; Leonelli *et al.*, 2025; Steenkamp and Baumgartner, 2000), therefore, the structural model was estimated (Table 4) to test the conceptual model (Figure 1). The overall fit of the structural model was satisfactory, with all indices meeting commonly accepted thresholds (Arıkan *et al.*, 2025; Leonelli *et al.*, 2025). The Comparative Fit Index (CFI=0.922) and Tucker–Lewis Index (TLI=0.914) both surpass the recommended threshold of 0.90, indicating an adequate incremental fit. The Root Mean Square Error of Approximation (RMSEA=0.054, with 90% confidence interval [0.051, 0.057]) fell well below the 0.08 threshold, suggesting a good approximation of model fit, while the Standardised Root Mean Square

Residual (SRMR=0.057) was also within the acceptable limit of 0.08. The model yielded a significant chi-square statistic, $\chi^2(422)=1794.475$, $p<0.001$. These statistics confirm that the model adequately represents observed data and support the robustness of the conceptual model's relationships.

- Insert Table 4 about here -

The structural model revealed statistically significant relationships among the constructs studied, providing support for a majority of hypotheses. Digital human capabilities (β=0.555***) and digital technological capabilities (β = 0.403***) of women's ventures are both positively and moderate associated with their digital collaboration capabilities, supporting hypotheses H1 and H2. In turn, digital collaboration capabilities significantly enhanced sensing (β=0.861***), seizing (β=0.795***), and reconfiguring capabilities (β=0.669***) of women's businesses, indicating their strong effects and central role in dynamic capability development and supporting hypotheses H3, H4, and H5. Regarding the determinants of resilience of women entrepreneurs, sensing capabilities showed a relatively weak positive effect (β=0.163**), while seizing capabilities exerted the most substantial positive influence (β=0.484***) of moderate effects, which supports hypotheses H6 and H7. Interestingly, reconfiguring capabilities displayed a significant but negative weak relationship with resilience of women entrepreneurs (β=–0.136***), challenging the assumption in hypothesis H8. Finally, the feminine role inventory had a moderate positive and substantial influence on the resilience of women entrepreneurs (β=0.320***), as assumed in the hypothesis H9.

Within the realm of dynamic capabilities, seizing capabilities exerted the most significant positive influence on the resilience of women entrepreneurs (β=0.484***), underscoring the importance of identifying and exploiting new opportunities for women entrepreneurs in dynamic environments. Sensing capabilities contributed more modestly (β=0.163**), suggesting that while scanning and interpreting signals is valuable, its effect on resilience is rather preparatory. Reconfiguring capabilities showed a significant but negative relationship with resilience (β=–0.136***), indicating that frequent or disruptive business adjustments may undermine the stability of

women entrepreneurs. Among all dimensions of dynamic capabilities, the impact of reconfiguring capabilities is the weakest based on the absolute parameter values.

When comparing the influence of dynamic capabilities with the feminine role inventory, seizing capabilities (β=0.484***) remain the strongest drivers among dynamic capabilities, while the feminine role inventory also exerts a substantial positive effect on resilience (β=0.320***). This suggests that both the ability to identify and exploit opportunities and the internalised feminine role identity play complementary roles in enhancing the resilience of women entrepreneurs, with opportunity-seizing slightly outweighing the contribution of role identity. As the next step, the structural model results were further examined using an effects decomposition, which enabled the estimation of indirect and total effects alongside the direct relationships (Table 5).

Among direct effects, the strongest structural relationships were observed between digital collaboration capability and sensing (β=0.861***) and between digital collaboration capabilities and seizing (β=0.795***), indicating very strong positive associations. Among the predictors of resilience, seizing showed the strongest positive effect (β=0.484***), followed by moderate effect of feminine role identity (β=0.320***) and a relatively weak effect of sensing (β=0.163**), whereas reconfiguring showed a comparatively weak negative association with resilience (β=−0.136***).

- Insert Table 5 about here -

The analysis of indirect effects revealed that the digital collaboration capabilities of women's ventures influenced their resilience through sensing (β=0.141**), seizing (β=0.385***), and reconfiguring capabilities (β=–0.091***). When considering both direct and indirect pathways, the total effect of digital collaboration capabilities on resilience was strong and positive (β=0.434***). The decomposition of effects also showed that digital human capabilities indirectly influenced the resilience of women entrepreneurs through digital collaboration capabilities and dynamic capabilities. Specifically, significant indirect effects were observed via sensing capabilities (β = 0.478***; through to resilience β=0.078**), seizing capabilities (β=0.441***; through to resilience β=0.214***), and

reconfiguring capabilities (β=0.372***; through to resilience β=–0.051***). Overall, the total effect of digital human capabilities of women's businesses on their resilience was positive and significant, but relatively weak (β=0.241***). Next, the analysis indicated that digital technological capabilities also affected resilience indirectly through digital collaboration capabilities and dynamic capabilities. Significant indirect effects were identified via sensing capabilities (β=0.347***; through to resilience β=0.057**), seizing capabilities (β=0.320***; through to resilience β=0.155***), and reconfiguring capabilities (β=0.269***; through to resilience β=–0.037***). Taken together, the total effect of digital technological capabilities on resilience was positive and significant, but relatively weak (β=0.175***).

When comparing the three dimensions of digital capabilities, digital collaboration capabilities emerged as the strongest drivers of women entrepreneurs' resilience (β=0.434***), highlighting the pivotal role of collaborative networks and partnerships in strengthening women entrepreneurs' adaptability. By contrast, digital human (β=0.241***) and digital technological capabilities (β=0.175***) contributed positively but more moderately to the resilience of women entrepreneurs, suggesting that while digital skills and technological tools are essential, their impact on resilience is maximised when channelled through effective collaboration. The model explained 47.1% of the variance in resilience (R^2=0.471), indicating that the predictors jointly account for a substantial proportion of variation in resilience. The explained variance was particularly high for digital collaboration capabilities (R^2=0.813), sensing (R^2=0.741), and seizing (R^2=0.632), while the model explained 44.8% of the variance in reconfiguring capability (R^2=0.448).

To further assess whether pooling the three national samples concealed systematic country differences, country dummy variables were incorporated into the structural model. Two model specifications with alternative reference categories were estimated to enable pairwise comparisons among Germany, Poland, and Slovakia. None of the pairwise country comparisons was statistically significant for feminine role identity or resilience. No significant pairwise differences were found for feminine role identity (Poland vs. Slovakia: β=0.022, p=0.551; Germany vs. Slovakia: β=0.002, p=0.958; Poland vs. Germany: β=0.020, p=0.578). For resilience, the estimated differences were very small and

not statistically significant (e.g., Poland vs Slovakia: β=0.007, p=0.552; Germany vs Slovakia: β=0.001, p=0.958; Poland vs Germany: β=0.007, p=0.579). These findings provide no evidence of systematic country differences in feminine role identity or resilience within the estimated model and support the use of the pooled sample for the main analysis.

Robustness analysis: reversed causality and alternative models

The conceptual model (Figure 1) was developed a priori from the theoretical framework and based on the hypotheses, and then tested using covariance-based structural equation modelling (CB-SEM), which is appropriate for evaluating theory-driven models involving latent constructs. Nevertheless, given the cross-sectional nature of the data, a reversed structural model was estimated to assess the sensitivity of the findings to an alternative causal ordering. In this specification, resilience was modelled as predicting sensing, seizing, and reconfiguring capabilities as well as feminine role identity, while the subsequent relationships among the capability constructs were specified in the reverse direction. All estimated factor loadings and structural paths in the reversed model were statistically significant. Thus, the cross-sectional data do not allow reciprocal relationships to be completely ruled out. However, the reversed model demonstrated somewhat weaker fit than the theoretically specified model. The hypothesised model yielded CFI=0.922, TLI=0.914, RMSEA=0.054, and SRMR=0.057, whereas the reversed model yielded CFI=0.902, TLI=0.892, RMSEA=0.061, and SRMR=0.084. These comparisons provide a slightly greater support for the theoretically specified model than for the alternative reversed specification. Accordingly, the hypothesised model is retained as the primary model, while the results of the reversed model are considered evidence that alternative directional relationships cannot be completely excluded.

To assess whether the findings are sensitive to the way the capability dimensions are conceptualised, we estimated two alternative model specifications. The first specification treats digital capabilities as the second-order construct (DIG), encompassing the three digital capability dimensions,

and examines their relationships with sensing, seizing, and reconfiguring capabilities and, subsequently, resilience. The second specification aggregates sensing, seizing, and reconfiguring capabilities into a higher-level construct representing dynamic capabilities (DYN), which is then modelled as a predictor of resilience. These alternative specifications provide robustness checks of the proposed structural relationships by examining whether the main conclusions remain consistent when the underlying capability dimensions are modelled at a more aggregated level (Table 6).

- Insert Table 6 about here -

The first alternative specification, in which digital capabilities were modelled as a higher-order construct (DIG), produced results consistent with the main model. DIG was strongly and positively associated with sensing (β=0.801***), seizing (β=0.739***), and reconfiguring capabilities (β=0.624***). Importantly, the relationships between the three capability dimensions and resilience remained highly consistent with those obtained in the main specification. Sensing remained positively associated with resilience (β=0.169***), as well as seizing (β=0.473***) whereas reconfiguring remained negatively associated with resilience (β=−0.118***). The positive association between feminine role identity and resilience also remained stable (β=0.315***).

The second alternative specification modelled sensing, seizing, and reconfiguring as a higher-order dynamic-capabilities construct (DYN). Digital capabilities were strongly associated with DYN through digital collaboration (β=0.792***), while the higher-order construct of dynamic capabilities was positively associated with resilience (β=0.469***). The positive relationship between feminine role identity and resilience also remained significant (β=0.354***). Overall, these alternative specifications provide support for the robustness of the main findings to different levels of aggregation of the capability dimensions.

Discussion

The empirical results of this study extend research on resilience (Matysek-Jędrych *et al.*, 2024) and entrepreneurship (De Clercq and Pereira, 2019) by explicitly focusing on women entrepreneurs

(Menzies *et al.*, 2024) who have to contend with endemic economic, societal, and structural constraints. Specifically, the study contributes to entrepreneurial resilience studies by integrating capability-based and gender-oriented perspectives. It explains how resilience dynamically emerges from the interplay of feminine roles and digital and dynamic capabilities. Through its empirical investigations of how digital capabilities, dynamic capabilities, and feminine role identity jointly shape the resilience of women entrepreneurs in the context of heightened uncertainty, the study provides evidence that resilience is not solely a function of firm-level resources or individual traits (Liyanagamage *et al.*, 2024; Matysek-Jędrych *et al.*, 2024), but emerges from the interaction between gendered identity and capability-based mechanisms. Crucially, by integrating digital and dynamic capabilities with a gender-sensitive perspective, the study further contributes to a more nuanced understanding of how women entrepreneurs adapt and persist in challenging environments.

Within the dynamic capabilities framework (Teece, 2016, 2018a; Zahra *et al.*, 2006), seizing capabilities emerged as the strongest positive driver of resilience, underscoring the centrality of opportunity recognition and timely strategic action in sustaining women-led ventures (Sahi *et al.*, 2023; Zhang *et al.*, 2025). In contrast to prior studies (Bhardwaj *et al.*, 2023; Joussen *et al.*, 2025), the negative association between reconfiguring capabilities and resilience, identified in this study suggests that continuous restructuring or frequent organisational change may strain already resource-constrained women-owned businesses. Rather than enhancing adaptability, as suggested by prior studies, excessive reconfiguration may erode stability, increase cognitive and emotional burdens, and weaken resilience, highlighting an important boundary condition within the dynamic capabilities literature.

The results further demonstrate that digital collaboration capabilities play a pivotal enabling role, indirectly strengthening resilience through dynamic capabilities. Digital collaboration facilitates access to external knowledge, networks, and shared problem-solving (Wang *et al.*, 2022), which in turn, enhances sensing and seizing activities (Nasiri *et al.*, 2023; Parida *et al.*, 2016). This finding reinforces emerging evidence that digital collaborative technologies are especially valuable for women entrepreneurs (Gray *et al.*, 2024), as they can reduce isolation, compensate for resource limitations,

and mitigate gender-based barriers in traditional business networks. The importance of digital collaboration capabilities for the resilience of women entrepreneurs aligns with previous research, which shows the value of shared usage of digital platforms in challenging gender discrimination against women entrepreneurs (Seyfi *et al.*, 2025).

In some ways, the study also contribute to the discussion of the gendered aspects of resilience by examining gender as a factor in resilience building (Bagheri *et al.*, 2024; Bridges *et al.*, 2023). Contrary to studies emphasising normative masculinity in organisational resilience (Witmer, 2019), and aligned with other studies (Bagheri *et al.*, 2024), this research's empirical results confirm that feminine roles shape women entrepreneurs' resilience, highlighting the gender identity. The significant direct effect of feminine role identity on resilience shows the strategic value of gendered leadership traits such as empathy, relational orientation, and collaborative leadership. Rather than constraining entrepreneurial performance, feminine roles appear to function as resilience-enhancing assets that support adaptive capacity under stress. This questions the dominant, masculinity-oriented assumptions embedded in resilience and entrepreneurship research and supports perspectives that view resilience as socially and structurally embedded rather than gender-neutral.

This study's empirical findings regarding the influence of femininity on women entrepreneurs' resilience extend the concept of gendered entrepreneurial resilience (Menzies et al., 2024). They clarify how the adaptive responses of women in Central Europe are propelled by the specific social and structural dynamics of these regions. In contrast to other contexts where resilience functions as a mode of resistance against systemic constraints (Seyfi et al., 2025), resilience in Central Europe derives from acquired skills, including digital competencies, and behavioral patterns such as the reconfiguration of capabilities essential for capitalizing on emerging market opportunities. Within this context, resilience among women entrepreneurs constitutes a dynamic and relational process, shaped by the interaction of digital collaboration, opportunity-oriented capabilities, and feminine identity. In

the Central European setting, resilience manifests not simply as a reaction to crisis but as a strategic asset that allows women entrepreneurs to navigate uncertainty, utilize digital connectivity, and maintain their enterprises despite structural limitations.

Research Implications

This study stimulates policy development initiatives by encouraging EU-level frameworks that foster inclusive and entrepreneurial resilience. Crucially, by focusing on how the interplay of feminine role identity, digital collaboration, and dynamic capabilities strengthens women's entrepreneurial resilience, the study aligns with the objectives of the European Pillar of Social Rights, particularly its emphasis on equal opportunities, quality employment, and support for entrepreneurial initiatives. The results provide a practical pathway for understanding the capabilities of women entrepreneurs, thereby supporting the EU's Gender Equality Strategy 2020-2025, which advocates for measures to dismantle structural barriers to women's economic participation and to promote their leadership in digital and innovative sectors. Rather than framing women entrepreneurs primarily as beneficiaries of social support, the study positions them as strategic economic actors whose resilience is enhanced through targeted investments in digital skills, collaborative infrastructures, and capability development. This perspective suggests that EU policies should evolve beyond generic SME support toward gender-responsive digital entrepreneurship programs that enable women to leverage collaboration and capability-building as resilience mechanisms, especially in contexts of crisis and uncertainty.

Moreover, business support organizations and practitioners seeking to empower women-led ventures can derive practical insights from this research. First, prioritizing digital collaboration is essential. Leveraging digital networks, knowledge-sharing platforms, and collaborative tools enables women entrepreneurs to access critical resources, identify potential opportunities, and navigate uncertainty more effectively. Second, targeted training and mentoring can strengthen dynamic capabilities, particularly in sensing and seizing, allowing women entrepreneurs to better recognize

emerging market trends and convert them into strategic initiatives. Third, acknowledging and utilizing feminine role identity as a strategic asset highlights the importance of relational, empathetic, and collaborative leadership styles in fostering resilience. By cultivating environments that validate these gender-based strengths instead of enforcing masculine norms, organizations and ecosystems can facilitate adaptive decision-making, enhance firm-level resilience, and advance inclusive entrepreneurship.

Limitations and suggestions for further research

Like any other research project, this study has it limitations that point to avenues for future research. First, because the quantitative research was designed to achieve the study's aims, it limits the ability to understand causal dynamics. Longitudinal studies could provide a deeper understanding of how digital, dynamic, and gendered capabilities evolve over time and influence resilience during different stages of crises. Second, the study focuses on women entrepreneurs in three Central European countries, which may limit generalizability to other cultural, institutional, or economic contexts. Future research could extend this framework to diverse geographic regions, including emerging and non-European economies, to examine variations in resilience mechanisms across contexts. Third, while this study integrates digital and dynamic capabilities with feminine role identity, other individual, organisational, or environmental factors, such as social capital, access to financing, or policy support, may also shape resilience and warrant further investigation.

Moreover, the cross-sectional research design also imposes limitations concerning endogeneity and causal inference. Although the conceptual model was derived from theory and demonstrated a better fit than a theoretically reversed specification, the significant relationships observed in the reversed model indicate that reciprocal relationships cannot be completely excluded. The findings should therefore be interpreted as evidence supporting the theoretically proposed associations rather than as definitive evidence of causality. Future research using longitudinal or multi-

wave designs could provide stronger evidence regarding temporal ordering and help address potential endogeneity arising from reciprocal causality and unobserved factors.

Concluding remarks

This study examined women entrepreneurs' resilience through the interplay of digital capabilities, dynamic capabilities, and feminine role identity. It demonstrated that feminine role identity and sensing/seizing capabilities enhance resilience, while excessive reconfiguration undermines it in women's entrepreneurship unfolding in a Central European setting. Within this context, digital collaboration indirectly supports women's entrepreneurial resilience by strengthening their dynamic capabilities. By integrating gendered perspectives with capability-based frameworks, the research brought into sharp focus traditional assumptions and provided the theoretical insights needed to build inclusive entrepreneurial ecosystems that leverage digital collaboration and feminine leadership traits.

Ethical Approval

This study was conducted in accordance with established ethical standards for research involving human participants. Ethical approval was obtained from the Research Ethics Committee for Studies Involving Human Participants at Poznań University of Economics and Business, pursuant to Resolution No. 35/2025, adopted on 27 June 2025. All participants were informed about the purpose of the study, the voluntary nature of their participation, and the confidentiality and anonymity of their responses. Informed consent was obtained from all participants prior to their participation in the study.

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Table 1. Profiles of women entrepreneurs who responded

Features	**Frequencies (shares)**
Country of operation	Germany: n=391 (35.1%) Poland: n=303 (27.2%) Slovakia: n=419 (37.7%)
Age	Mean: 41.4 years Standard deviation: 11.3 years
Education level	Primary: n=9 (0.8%) Secondary and vocational: n=453 (40.7%) Tertiary: n=651 (58.5%)
Being in a marriage (partnership)	Yes: n=632 (56.8%) No: n=453 (40.7%) Prefer not to specify: n=28 (2.5%)
Having a child	Yes: n=720 (64.7%) No: n=376 (33.8%) Prefer not to specify: n=17 (1.5%)
Years of entrepreneurial experience	Up to 2 years: n=153 (13.7%) 2 to 5 years: n=271 (24.4%) 5 to 10 years: n=268 (24.1%) Over 10 years: n=421 (37.8%)
Size of respondents' businesses	Solo entrepreneurs (0 employees): n=421 (37.8%) Micro companies (1-9 employees): n=323 (29.0%) Small and medium-sized companies (10-249 employees): n=274 (24.6%) Large companies (over 250 employees): n=95 (8.6%)

Source: Authors' own work

Table 2. Measurement scale constructs and convergent validity

Construct	Item	Loading	SE	Average variance extracted (AVE)	Composite-factor-Reliability (CR)	Coefficient Cronbach's α	Coefficient McDonald's ω
Resilience of women entrepreneurs (RES)	RES1	0.721***	0.017	0.529	0.848	0.847	0.850
	RES2	0.762***	0.016				
	RES3	0.743***	0.016				
	RES4	0.732***	0.017				
	RES5	0.674***	0.019				
Digital human capabilities (DH)	DH1	0.768***	0.015	0.599	0.817	0.815	0.818
	DH2	0.794***	0.014				
	DH3	0.760***	0.016				
Digital technological capabilities (DT)	DT1	0.811***	0.012	0.644	0.879	0.878	0.879
	DT2	0.849***	0.011				
	DT3	0.782***	0.014				
	DT4	0.767***	0.014				
Digital collaboration capabilities (DC)	DC1	0.701***	0.019	0.506	0.755	0.755	0.753
	DC2	0.716***	0.018				
	DC3	0.719***	0.018				
Sensing capabilities (SN)	SN1	0.719***	0.017	0.530	0.772	0.770	0.772
	SN2	0.726***	0.017				
	SN3	0.740***	0.017				
Seizing capabilities (SZ)	SZ1	0.723***	0.017	0.545	0.828	0.823	0.831
	SZ2	0.723***	0.017				
	SZ3	0.785***	0.014				
	SZ4	0.723***	0.017				
Reconfiguring capabilities (RC)	RC1	0.727***	0.017	0.594	0.854	0.851	0.855
	RC2	0.753***	0.016				
	RC3	0.854***	0.012				
	RC4	0.744***	0.016				
Feminine role inventory (F)	F1	0.710***	0.018	0.509	0.841	0.837	0.838
	F2	0.757***	0.016				
	F3	0.749***	0.017				
	F4	0.742***	0.017				
	F5	0.624***	0.021				

Note: ***p<0.001.

Source: Authors' own work

Table 3. Discriminant validity based on the Heterotrait-Monotrait ratio of correlations (HTMT) and the correlation matrix

	RES	DH	DC	DT	SN	SZ	RC	F
Heterotrait-Monotrait ratio of correlations (HTMT)								
RES	1.000							
DH	0.528	1.000						
DC	0.400	0.802	1.000					
DT	0.411	0.769	0.818	1.000				
SN	0.560	0.706	0.686	0.686	1.000			
SZ	0.657	0.708	0.610	0.616	0.893	1.000		
RC	0.270	0.561	0.592	0.529	0.642	0.557	1.000	
F	0.503	0.277	0.190	0.264	0.337	0.425	0.191	1.000
Correlation matrix								
RES	1.000							
DH	0.528	1.000						
DC	0.402	0.802	1.000					
DT	0.411	0.769	0.819	1.000				
SN	0.563	0.707	0.689	0.688	1.000			
SZ	0.658	0.707	0.616	0.614	0.892	1.000		
RC	0.312	0.572	0.599	0.540	0.660	0.591	1.000	
F	0.499	0.287	0.205	0.265	0.341	0.421	0.225	1.000

Source: Authors' own work

Table 4. Results of structural equation modelling (CB-SEM)

Variable Structural Path			Unstandardised coefficient	Standardised coefficient				Hypotheses
				Beta	SE	[95% conf. interval]		
DH	→	DC	0.517***	0.555***	0.040	0.476	0.634	H1: supported
DT	→	DC	0.342***	0.403***	0.041	0.323	0.482	H2: supported
DC	→	SN	0.874***	0.861***	0.016	0.830	0.892	H3: supported
DC	→	SZ	0.783***	0.795***	0.017	0.762	0.828	H4: supported
DC	→	RC	0.726***	0.669***	0.021	0.628	0.711	H5: supported
SN	→	RES	0.135**	0.163**	0.051	0.063	0.263	H6: supported
SZ	→	RES	0.411***	0.484***	0.046	0.395	0.574	H7: supported
RC	→	RES	-0.105***	-0.136***	0.038	-0.211	-0.061	H8: not supported; impact reversed from assumed
F	→	RES	0.338***	0.320***	0.029	0.264	0.376	H9: supported

Note: ***p<0.001, **p<0.01

Source: Authors' own work

Table 5. Decomposition of effects into indirect and total effects

Structural Path	Beta	SE	[95% conf. interval]	
Indirect effects				
DC → SN → RES	0.141**	0.044	0.054	0.227
DC → SZ → RES	0.385***	0.038	0.309	0.460
DC → RC → RES	-0.091***	0.026	-0.142	-0.040
DH → DC → SN	0.478***	0.036	0.408	0.548
DH → DC → SN → RES	0.078**	0.025	0.029	0.127
DH → DC → SZ	0.441***	0.033	0.376	0.507
DH → DC → SZ → RES	0.214***	0.026	0.162	0.265
DH → DC → RC	0.372***	0.029	0.314	0.429
DH → DC → RC → RES	-0.051***	0.015	-0.080	-0.021
DT → DC → SN	0.347***	0.035	0.277	0.416
DT → DC → SN → RES	0.057**	0.019	0.020	0.093
DT → DC → SZ	0.320***	0.033	0.256	0.384
DT → DC → SZ → RES	0.155***	0.022	0.112	0.198
DT → DC → RC	0.269***	0.028	0.214	0.325
DT → DC → RC → RES	-0.037***	0.011	-0.058	-0.015
Total effects (addition to Table 4, only when the indirect effect exists)				
DC → RES	0.434***	0.026	0.384	0.484
DH → RES	0.241***	0.023	0.197	0.285
DT → RES	0.175***	0.020	0.135	0.215
DH → SN	0.478***	0.036	0.408	0.548
DH → SZ	0.441***	0.033	0.376	0.507
DH → RC	0.372***	0.029	0.314	0.429
DT → SN	0.347***	0.035	0.277	0.416
DT → SZ	0.320***	0.033	0.256	0.384
DT → RC	0.269***	0.028	0.214	0.325

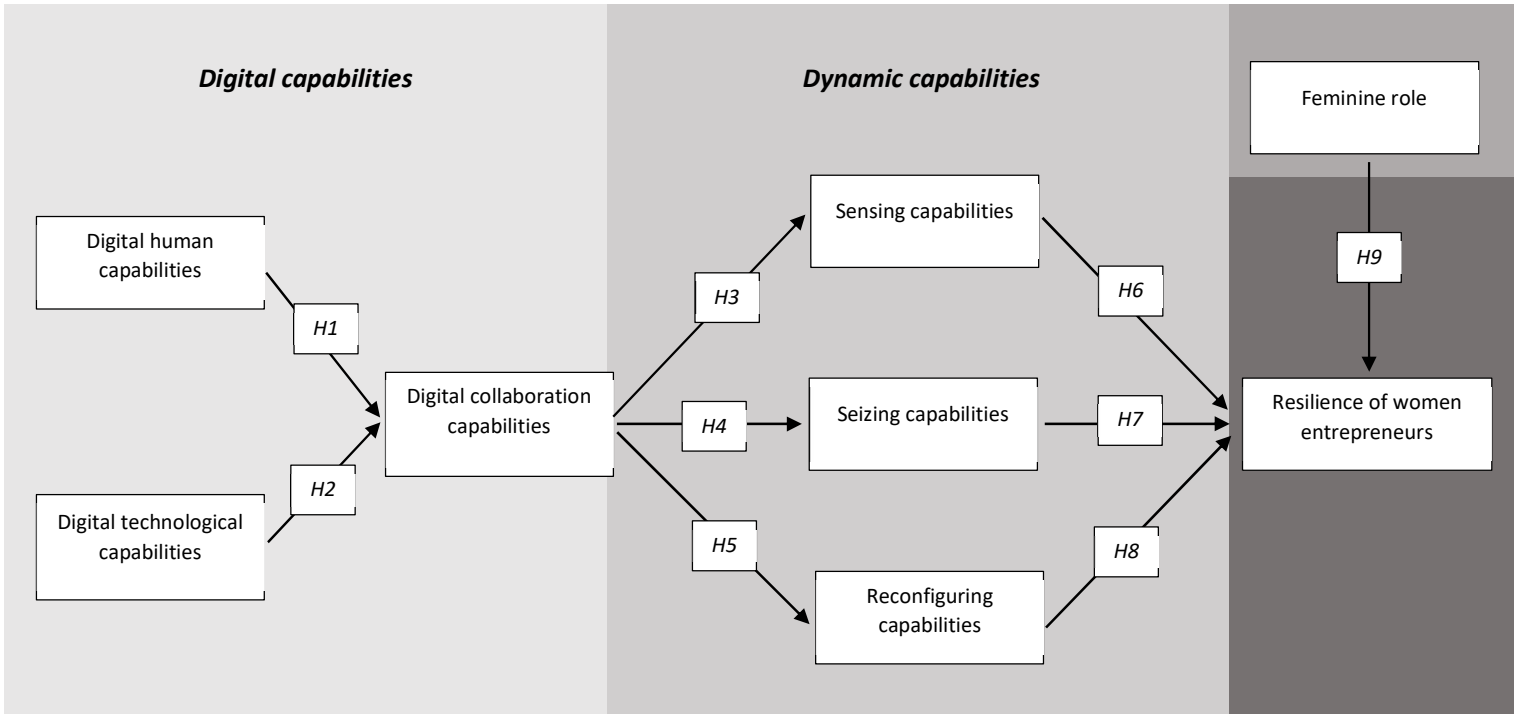
Note: ***p<0.001, **p<0.01.
Source: Authors' own work

Table 6. Results of robustness check

Variable Structural Path			Standardised coefficient			
			Beta	SE	[95% conf. interval]	
Digital capabilities (DIG) as a higher-order construct						
DIG	→	SN	0.801***	0.017	0.767	0.835
DIG	→	SZ	0.739***	0.018	0.703	0.775
DIG	→	RC	0.624***	0.022	0.581	0.667
SN	→	RES	0.169***	0.043	0.083	0.254
SZ	→	RES	0.473***	0.039	0.397	0.550
RC	→	RES	-0.118***	0.035	-0.188	-0.049
F	→	RES	0.315***	0.029	0.258	0.372
Dynamic capabilities (DYN) as a higher-order construct						
DH	→	DC	0.528***	0.042	0.446	0.609
DT	→	DC	0.456***	0.041	0.375	0.537
DC	→	DYN	0.792***	0.016	0.761	0.823
DYN	→	RES	0.469***	0.027	0.418	0.521
F	→	RES	0.354***	0.029	0.297	0.410

Source: Authors' own work

Figure 1. The conceptual model of the resilience of women entrepreneurs



Source: Authors' idea