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Organizational Resilience as a Bridge Between Innovative Climate and Product Innovation: Evidence from the Turkish Chemical Sector

Abstract

Research background and purpose: This study investigates the mediating role of organizational resilience in the relationship between innovation climate and product innovation within companies operating in the chemical sector in Türkiye.
Design/methodology/approach: Employing a cross-sectional design and quantitative research methods, data were collected from 311 participants through a survey technique. The data were analyzed using SPSS, AMOS, and PROCESS Macro software.
Findings: The findings indicate that the innovation climate has a significant and positive impact on both organizational resilience and product innovation. Furthermore, organizational resilience was found to play a statistically significant mediating role in the relationship between innovation climate and product innovation. These results suggest that fostering an innovative climate not only enhances an organization's product development capabilities but also strengthens its ability to withstand crises—positioning resilience as a supportive factor in driving product innovation.
Value added and limitations: This research contributes to the theoretical literature while offering strategic insights for practitioners. In particular, within the highly dynamic chemical industry, it is essential for managers to promote open communication, cultivate a learning-oriented culture, and establish flexible organizational structures to reinforce both innovation and resilience concurrently.

Keywords: *organizational resilience, innovation climate, product innovation, dynamic capabilities theory, componential model of creativity*

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1. Introduction

Organizations operating in environments characterized by constant change, expanding international collaborations, rapid technological advancements, and recurring crises are increasingly compelled to demonstrate resilience and develop innovative solutions in response to these dynamic conditions. This necessity becomes even more pronounced in economies experiencing persistent fluctuations, where organizational resilience is vital for ensuring long-term success and sustainability. In such highly unstable environments, considering resilience and innovation as dynamic capabilities enables firms to handle crises more effectively, adjust quickly to changing market conditions, and maintain long-term competitiveness (Garrido-Moreno et al., 2024).

The Turkish economy, in particular, exemplifies such fragility. Due to its geopolitical positioning, it is susceptible not only to global economic crises but also to regional political tensions. Additionally, persistent high inflation and unemployment rates contribute to ongoing economic instability. These challenges underscore the importance of organizational resilience. According to the 2023 Global Crisis and Organizational Resilience Survey, 89% of organizational leaders identified resilience as a strategic priority, emphasizing its role in enhancing competitiveness and enabling proactive responses to change (PwC, 2023).

However, cultivating organizational resilience—critical for competitiveness and delivering improved products and services to society—is not easily achieved. It requires the presence of a creative and innovative organizational climate (Mafabi et al., 2015). Innovation, in this context, transcends its traditional role of fostering new products and processes. It becomes a foundational element that enables organizational restructuring and strategic transformation by facilitating the reconfiguration of existing resources (Erkmen et al., 2020; Okun, 2022). On the other hand, organizational resilience contributes to innovation by creating a secure atmosphere that stimulates creativity and facilitates the design of novel approaches (Jin, 2024). As a form of dynamic capability, resilience allows firms to confront unexpected challenges, take rapid operational action (Altintas, 2020), and strengthen performance outcomes through effective risk handling (Makkonen et al., 2014; Nair et al., 2014).

Prior research has predominantly examined innovation climate, organizational resilience, and product innovation either in isolation or through dyadic associations. However, integrative studies that bring these constructs together within a unified framework—particularly by positioning organizational resilience as a mediating mechanism—remain scarce. To address this gap, the present study investigates how innovation climate enhances organizational resilience and how resilience, in turn, facilitates product innovation. Within this framework, organizational resilience is conceptualized and empirically tested as a mediator, serving as the important linkage between a supportive innovation climate and product innovation outcomes.

The theoretical foundation of this study draws on Amabile's Componential Theory of Creativity (1997), which underscores the centrality of organizational climate in promoting creativity and innovation, as well as on the Dynamic Capabilities Theory, which frames organizational resilience as a strategic capability that enables sustained innovation and long-term adaptability.

In this framework, the current research explores how innovation and resilience function as dynamic capabilities within firms in Türkiye's chemical industry, a strategically vital sector characterized by substantial R&D activities and high value-added production. In 2022, the chemical sector in Türkiye achieved a total trade volume of 67 billion USD. As of 2023, exports reached 30 billion USD, while imports stood at 50.8 billion USD. The sector comprises over 29,000 enterprises and provides employment to approximately 453,000 individuals. Notably, it has experienced a 67% increase in exports over the last five years and ranked second among Türkiye's leading export sectors in 2023 (T.C. Ticaret Bakanlığı, n.d.). Given the sector's strategic role and exposure to intense global competition, it is imperative to understand how an innovation-supportive climate influences organizational resilience, and how resilience, in turn, affects product innovation. Understanding these relationships offers meaningful guidance to chemical companies aiming to strengthen their innovation capability and resilience when confronted with global crises and market uncertainties. Furthermore, such understanding may inform managerial practices aimed at building sustainable innovation systems capable of withstanding and thriving amid external shocks.

The purpose of this study is twofold: (i) to investigate how innovative climate affects organizational resilience and product innovation, and (ii) to determine whether resilience serves as a mediating mechanism between innovative climate and product innovation. Accordingly, the research addresses four core questions:

1. In what ways does an innovative climate shape organizational resilience?
2. How does an innovation-oriented environment contribute to product innovation?
3. What is the direct impact of organizational resilience on product innovation?
4. Does organizational resilience function as a conduit through which an innovative climate enhances product innovation?

The opening section grounds the constructs of innovation and organizational resilience within the Dynamic Capabilities Theory and the Componential Model of Creativity. A subsequent literature review outlines the focal variables, elaborates on their interrelationships, and formulates the corresponding hypotheses. The third section—the Materials and Methods—details the measurement instruments, sampling strategy, and data-analytic procedures. Section four reports the empirical findings, including validity, reliability, and hypothesis testing. The final section offers a discussion of the results, acknowledges study limitations, and presents practical implications alongside avenues for future inquiry, culminating in the overall conclusion.

2. Theoretical framework and hypotheses development

2.1. Organizational resilience and innovation within the framework of the dynamic capabilities theory and the componential model of creativity

Organizational resilience, as a construct rooted in the Dynamic Capabilities (DC) Theory, plays a pivotal role in enhancing firms' learning processes and strengthening their capacity for innovation. First introduced by Teece et al. (1997), Dynamic Capabilities Theory highlights how organizations adapt to environmental shifts by renewing and reconfiguring their internal and external competencies. According to this perspective, it is insufficient for firms to merely possess valuable resources; rather, they must also be capable of deploying and modifying these resources flexibly in response to environmental opportunities and threats.

DC Theory identifies three fundamental processes—sensing, seizing, and transforming—which enable firms to maintain competitiveness in dynamic environments. "Sensing" denotes recognizing opportunities and threats in the external environment, "seizing" refers to deploying resources to exploit those opportunities, while "transforming" highlights the ongoing renewal and adjustment of organizational capabilities to maintain performance (Teece et al., 1997; Teece, 2007). By engaging in these processes, organizations can more effectively handle environmental volatility, draw lessons from prior experiences, and adapt successfully to change (Day & Schoemaker, 2016; Kurtz & Varvakis, 2016). More recently, this theory has been applied to examine how specific dynamic capabilities—such as organizational resilience—can support strategic adaptation and survival during times of crisis (Mhlanga & Dzingirai, 2024).

Within this theoretical framework, both innovation and organizational resilience are intrinsically connected to the concept of dynamic capabilities. Innovation may be regarded as an outcome of dynamic capabilities, whereby firms utilize their capacity to sense and seize opportunities, reconfigure resources, and develop new products, services, or processes that enhance competitive advantage (Teece, 2007; Ledesma-Chaves & Arenas-Gaitán, 2023). Conversely, organizational resilience can be conceptualized as a distinct dynamic capability that enables firms to anticipate potential threats, respond effectively to disruptions, and learn from adverse experiences, thereby strengthening adaptability and long-term viability (Duchek, 2015; Martín-Rojas et al., 2023). From this perspective, dynamic capabilities constitute the foundation upon which both innovation and resilience rest, as they foster organizational agility, learning, and responsiveness—prerequisites for continuous renewal (Lütjen et al., 2019). Accordingly, resilience and innovation should be viewed as complementary manifestations of dynamic capabilities, mutually reinforcing one another in enabling firms to navigate uncertainty and sustain performance under

pressure (Do et al., 2022; Garrido-Moreno et al., 2024). This is especially pertinent in industries characterized by high volatility and rapid technological change, such as the chemical sector. In such contexts, cultivating resilience and innovation as intertwined dynamic capabilities is vital for ensuring long-term competitiveness and growth in global markets.

Amabile's Componential Model of Creativity offers an integrative framework that combines personal and contextual factors to explain how organizations nurture creativity and innovation. The model posits that four essential components must be present to stimulate creativity: (a) domain-relevant skills, which refer to the knowledge and expertise specific to a given field; (b) creativity-relevant processes, encompassing cognitive styles, personality traits, and thinking strategies that promote novel ideation; (c) intrinsic task motivation, which relates to an individual's inherent interest and passion for the work itself; and (d) the social or work environment, which constitutes the organizational context that can either facilitate or inhibit creative performance (Amabile, 1996; Amabile & Pratt, 2016). Importantly, the model emphasizes that individual capabilities alone are insufficient for sustained creativity and innovation. A supportive organizational environment—often referred to as a creative climate—is equally critical. Such a climate is characterized by features like autonomy, encouragement of risk-taking, constructive feedback, and open communication, all of which contribute to an atmosphere conducive to innovation. By fostering a creative climate, organizations increase their potential to develop innovative products and services while simultaneously reinforcing resilience, which reflects their capacity to adapt to and grow through challenging conditions.

In accordance with this perspective, Mafabi et al. (2015) examined, through empirical analysis, how creative climate relates to both innovation and institutional resilience. Their findings suggest that a positive creative climate fosters innovation, which in turn enhances institutional resilience. This implies that innovation functions as a mediating mechanism through which a supportive creative climate contributes to the resilience of organizations, thereby reinforcing the significance of both environmental and individual-level factors in building adaptive and innovative capabilities.

2.2. Innovation climate and product innovation

A review of the literature reveals substantial scholarly interest in the relationships between innovation climate and various innovation-related outcomes, such as creative behavior, product innovation, and organizational innovation (Lin, 2023; Demircioglu, 2023; Ye et al., 2021; Çekmecelioğlu & Özbağ, 2016; Gumusluoglu & Ilsev, 2009; Amabile et al., 1996; Shalley et al., 2000). Although these studies shed light on the influence of innovation climate on innovation processes and results, there is still limited research

that views it both as an outcome of innovative climate and as a factor driving product innovation. Addressing this gap, the present study conceptualizes innovation climate as a precursor to both organizational resilience and product innovation, and views organizational resilience not only as a consequence of innovation climate, but also as a facilitator and mediating mechanism in the relationship between innovation climate and product innovation.

Innovation climate serves as a fundamental organizational condition that enables the initiation and sustainability of various forms of innovation. Since innovation entails the development and implementation of novel and valuable ideas regarding products, services, or processes (Amabile, 1996; Oldham & Cummings, 1996), it necessitates an environment that nurtures creative expression and risk-taking. An innovation-supportive climate—characterized by openness to new ideas, tolerance for failure, encouragement of experimentation, and support for individual autonomy—fosters such an environment (Scott & Bruce, 1994). Within this context, employees are more likely to perceive psychological safety (Baer & Frese, 2003), engage in knowledge sharing (Jung et al., 2003), and experience enhanced intrinsic motivation (Amabile, 1996), all of which contribute to the generation and application of creative ideas in product development processes (Rosing et al., 2011).

In their recent systematic literature review, Newman et al. (2020) identified leadership, team characteristics, and individual employee characteristics as key antecedents of an innovation climate. The review further highlighted that the outcomes of innovation climate manifest across individual, team, and organizational levels. The authors emphasized that innovation climate is strongly associated with employee attitudes and behaviors, fostering innovative actions by cultivating a heightened enthusiasm for creativity and invention (Newman et al., 2020). Empirical studies provide substantial support for the notion that an innovative organizational climate fosters various innovation processes (Amabile et al., 1996; Yuan & Woodman, 2010; Song et al., 2020; Yang & Entebang, 2025). Collectively, these findings suggest that an innovation-supportive climate can serve as a catalyst for product innovation. Based on these theoretical and empirical foundations, the following hypothesis is proposed:

H1. Innovation climate has a positive effect on product innovation.

2.3. Organizational resilience and product innovation

Organizational resilience—the capacity to adapt to change, cope with adversity, and surmount disturbances (Lopez et al., 2024)—is pivotal to long-term business success because it enables firms to recover from disruptions and emerge stronger when confronted with external shocks (Hollands et al., 2023; Garrido-Moreno et al., 2024). By deploying proactive strategies, redesigning operational processes, and adopting adaptive

responses to environmental volatility, resilience capabilities mitigate the adverse effects of disturbances (Duchek, 2020) and thereby advance corporate sustainability in increasingly turbulent contexts (Ciasullo et al., 2023). Empirical evidence further shows that resilience and innovation are mutually reinforcing: innovation, by fostering continuous renewal and adaptation, cultivates resilience (De Carvalho et al., 2016), while resilience itself serves as an enabling mechanism that accelerates both incremental and radical innovation—such as radical green innovation, which enhances survival in volatile, complex, and uncertain environments (Xue & Wang, 2024). Illustratively, Liang and Li (2023) report that organizational resilience boosts sustainability performance through heightened innovation input.

Breznitz (2007) posits that resilient organizations not only ensure continuity but can also achieve industry leadership through sustained innovative efforts. Resilient firms foster innovation by leveraging internal knowledge and ideas, recombining and refining them to support the development of new products (Akgün & Keskin, 2014). These firms demonstrate the ability to respond effectively to unforeseen challenges by rapidly acquiring and applying new knowledge, thereby maintaining momentum in product development initiatives (Duchek, 2020). Corroborating this perspective, the recent meta-analysis conducted by Jin (2024) provides robust evidence of a significant positive association between organizational resilience and innovation. This relationship appears to be particularly pronounced when resilience is conceptualized as an internal organizational capability and innovation is framed as a dynamic, evolving process. Based on these insights, the following hypothesis is proposed:

H2: Organizational resilience positively influences product innovation.

2.4. Innovation climate and organizational resilience

Innovation is generally understood as the introduction of new ideas, processes, products, or services into organizational practice. It may manifest as significantly improved goods or services, novel operational processes, changes in organizational structures or practices, new external relations, or the adoption of alternative marketing or managerial approaches (Damanpour, 1991; Amabile et al., 1996). At the core of innovation lies creativity, which is often regarded as the foundational element or precursor of innovation. Creativity, influenced by one's expertise, thinking processes, and inner motivation, is described as the ability to produce original and meaningful ideas, products, or solutions (Amabile et al., 1996).

For innovation to be effectively realized, it must be supported by a conducive organizational climate or culture that fosters creative and innovative behaviors. When firms foster risk tolerance, autonomy, and opportunities for employee learning and experimentation, they create what can be defined as an innovation-oriented climate

or culture (Scott & Bruce, 1994; Martín-de Castro et al., 2013). An innovation-driven culture not only promotes the generation and implementation of new ideas but also plays a vital role in enhancing organizational resilience. From this perspective, innovation represents a vital component of organizational adaptive capacity and flexibility—two characteristics fundamental to resilience.

Empirical research supports the notion that both innovation and resilience are essential dynamic capabilities that contribute to organizational sustainability in volatile environments. For instance, a study involving 343 service-sector firms in Spain demonstrated that promoting both innovation and resilience is strategically necessary for success in uncertain markets (Garrido-Moreno et al., 2024). Likewise, Mafabi et al. (2015) demonstrated that a creative organizational climate positively and significantly influences both innovation and resilience. The study further revealed that innovation serves as a partial mediator in the relationship between creative climate and resilience, emphasizing the value of fostering creativity to improve resilience levels (Mafabi et al., 2015). Chowdhury et al. (2025) recently offered empirical evidence consistent with these conclusions, revealing that an innovative organizational climate significantly enhances organizational resilience. Considering the existing theoretical and empirical evidence, the following research hypothesis is advanced:

H3: Innovation climate positively influences the organizational resilience of firms.

2.5. The mediating role of organizational resilience

An innovation-supportive climate fosters a continuous flow of creative ideas within organizations, enhancing employees' capacity to adapt quickly and respond proactively to environmental uncertainties (Carmeli & Markman, 2011). This type of work environment supports the stages outlined in Denyer et al.'s (2011) organizational resilience framework—namely, information gathering, interpretation, and response—by enabling organizations to better detect, make sense of, and respond strategically to external signals. As such, an innovation climate contributes to embedding resilience-related capabilities such as adaptability, resource flexibility, and the ability to emerge stronger from adversity into the organizational fabric (Duchek, 2020; Lengnick-Hall et al., 2011).

Within this perspective, resilience may operate as a central mechanism that mediates the influence of innovation climate on product innovation. The resilience encouraged by an innovation climate can boost the productivity of R&D processes and aid in turning innovative ideas into actual product outcomes. Moreover, it enables firms to more effectively navigate the risks associated with radical innovation in volatile and uncertain market conditions. Accordingly, an innovation climate can indirectly promote product innovation by strengthening the organization's resilience capacity. Through this

mediating pathway, innovation-oriented organizations are better positioned to sustain and enhance their product innovation performance over time. In line with this rationale, the following research hypothesis is put forward:

H4: Organizational resilience mediates the relationship between innovation climate and product innovation.

3. Materials and methods

3.1. Measures

In order to test the hypotheses, validated multi-item scales from earlier studies were employed to capture the constructs of interest. The data collection process relied on a survey conducted with convenience sampling. Each participant rated the items using a five-point Likert scale, spanning from 1 = "Strongly Disagree" to 5 = "Strongly Agree."

- **Innovative Climate** was measured using the 5-item scale developed by Malik and Wilson (1995). Example items from this scale are: "Our organization is always moving toward the development of new answers.", "Our organization has a flexible structure that continuously adapts to change"
- **Product Innovativeness** was assessed using the 6-item scale developed by Akgün and Keskin (2014). Example items from this scale include: , "In new product and service introductions, our firm is often first to market." , "Our new products and services are often perceived as novel by customers."
- **Organizational Resilience** was measured using the scale developed by Kantur and Say (2015). This scale consists of three dimensions: robustness, agility, and integrity, comprising a total of 9 items. Specifically, 4 items are dedicated to measuring robustness, another 3 items to assess agility and 2 items to evaluate integrity.
  Examples of scale items include statements such as "Our organization is successful in generating diverse solutions" (robustness), "Our organization rapidly takes action" (agility), and "Our organization is successful in acting as a whole with all of its employees" (integrity). These items are designed to comprehensively reflect the respective dimensions of organizational resilience.

Although the scales employed in this study were originally developed some time ago, they were deliberately selected due to their widespread acceptance in the literature, their repeatedly demonstrated validity and reliability, their strong alignment with the conceptual framework of the research, and their ability to facilitate meaningful comparisons with prior studies.

3.2. Sampling

This study seeks to investigate the complex relationships between innovative climate, organizational resilience, and product innovativeness. To empirically test the proposed hypotheses, data were collected through a survey administered to white-collar employees working in the chemical industry in the Marmara region of Türkiye between April 9 and April 25, 2025. A convenience sampling method was employed, and initial contact was established via telephone, during which the purpose of the study was clearly communicated to potential participants. Among the 500 employees contacted, 442 agreed to participate in the study, and 327 completed the survey. Following a thorough review of the completed surveys, responses with missing data were excluded, yielding a final sample of 311 participants included in the subsequent analyses. The sample size is deemed adequate for the applied statistical techniques, as it surpasses the commonly accepted minimum thresholds for structural equation modeling as well as for mediation analyses (Kline, 2015; Hair et al., 2017).

Table 1. **Participants' demographic profile**

Variable	Category	Frequency	Percent
Gender	Male	211	67.8%
	Female	100	32.2%
Age	18–24	13	4.2%
	25–31	57	18.3%
	32–38	92	29.6%
	39–45	92	29.6%
	46–52	40	12.9%
	53–59	13	4.2%
	60 and above	4	1.3%
Education	Primary School	3	1.0%
	High School	22	7.1%
	Vocational School	26	8.4%
	Bachelor's Degree	151	48.6%
	Master's Degree	100	32.2%
	Doctorate	9	2.9%

Variable	Category	Frequency	Percent
Organizational tenure	1–3 years	128	41.2%
	4–6 years	55	17.7%
	7–10 years	46	14.8%
	11–15 years	37	11.9%
	16 years and above	45	14.5%
Total tenure	1–3 years	22	7.1%
	4–6 years	29	9.3%
	7–10 years	54	17.4%
	11–15 years	73	23.5%
	16 years and above	133	42.8%
Total		**311**	**100%**

Source: own study

Table 1 illustrates the demographic features of the participants. In terms of age, the majority belonged to the 32–45 range, with identical percentages (29.6%) recorded for the 32–38 and 39–45 subgroups. This is followed by participants aged 25–31 (18.3%) and 46–52 (12.9%), while younger (18–24, 4.2%) and older (53 and above, 5.5%) age groups are less represented. These figures suggest that the sample predominantly consists of mid-career professionals.

The gender distribution reveals a significant imbalance, with 67.8% identifying as male and 32.2% as female. This male dominance may reflect broader gender dynamics in the sampled industry or region and could influence interpretations related to workplace perceptions and experiences.

Looking at educational background, close to half of the sample (48.6%) were bachelor's graduates, while 32.2% had completed master's studies and 2.9% had achieved a doctoral level. The remaining participants report lower educational attainment, with 8.4% having an associate degree, 7.1% a high school diploma, and only 1.0% completing primary school. This indicates a highly educated sample, concentrated in higher education levels.

As for organizational tenure, the largest group of participants (41.2%) reported being with their present employer for 1–3 years, while 17.7% had 4–6 years and 14.8% had 7–10 years of experience. Only 14.5% have tenure of 16 years or more. This distribution highlights a workforce with relatively short to moderate lengths of service within their current organizations.

Looking at total career tenure, 42.8% of participants have over 16 years of work experience, suggesting that many respondents are seasoned professionals despite shorter organizational tenure. This is followed by those with 11–15 years (23.5%) and 7–10 years (17.4%), while only 7.1% report 1–3 years of total experience.

In total, the study sample comprises 311 respondents, predominantly male, well-educated, and mid-career professionals, providing a robust basis for analyzing the constructs of interest in the study.

3.3. Data analysis

Data analysis relied on multiple statistical procedures implemented through SPSS and AMOS. Reliability and validity assessments involved composite reliability (CR), Cronbach's alpha, and average variance extracted (AVE). Confirmatory factor analysis (CFA) was used to determine the adequacy of model fit, considering indices such as CMIN/DF, CFI, IFI, TLI, and RMSEA. The PROCESS macro (Hayes, 2013) was then applied to test both direct and indirect effects. Hypothesis testing and the significance of indirect effects were analyzed through bootstrapping procedures, as outlined by Shrout and Bolger (2002).

4. Results

4.1. Descriptive statistics

The descriptive statistics are presented in Table 2. An examination of the mean values for the study variables reveals that participants expressed the highest level of agreement with the robustness dimension (M = 3.81), reflecting a notably positive perception of their organizations' capacity to generate diverse solutions. The dimensions of Agility (M = 3.47) and Innovative Climate (M = 3.49) exhibited above-average mean values, situated close to the "agree" category, thereby suggesting a generally favorable, though somewhat limited, perception of organizational adaptability and the cultivation of an innovative climate. Integrity (M = 3.35) and Product Innovation (M = 3.35), while registering the lowest means, nonetheless remained above the mid-point of the scale, indicating a positive but comparatively cautious evaluation of organizational integrity and product innovation performance. Taken together, these results suggest that participants held moderately to highly positive perceptions of the focal constructs, with the robustness dimension in particular emerging as the most strongly endorsed.

Table 2. **Descriptive statistics**

	Mean	Std. deviation
Robustness	3.814	0.926
Agility	3.474	1.049
Integrity	3.352	1.087
Innovative climate	3.493	0.952
Product innovation	3.354	0.934

Source: own study

4.2. Validity and reliability

To assess convergent validity, a confirmatory factor analysis (CFA) was conducted using IBM AMOS 22 to evaluate the proposed measurement model. As organizational resilience was conceptualized as a second-order construct integrating robustness, integrity, and agility, the study employed a second-order factor analysis within the AMOS-SEM environment.

Once one item with a weak factor loading was deleted from the organizational resilience scale, the modified measurement model indicated an acceptable level of fit, as all indices complied with the recommended thresholds (Hair et al., 2010). A thorough review of the revised scale confirmed that the exclusion of this item did not compromise the content validity of the construct.

The goodness-of-fit indices for the final model were as follows: CMIN/DF = 3.375, $p < .001$; TLI = 0.968; IFI = 0.980; CFI = 0.980; and RMSEA = 0.088. While RMSEA values ≤ 0.08 are generally regarded as indicative of an acceptable model fit, it is important to note that some scholars suggest that RMSEA values as low as 0.01 may reflect an excellent fit, and values approaching 0.10 may still be considered acceptable in the context of complex models with lower degrees of freedom (MacCallum et al., 1996).

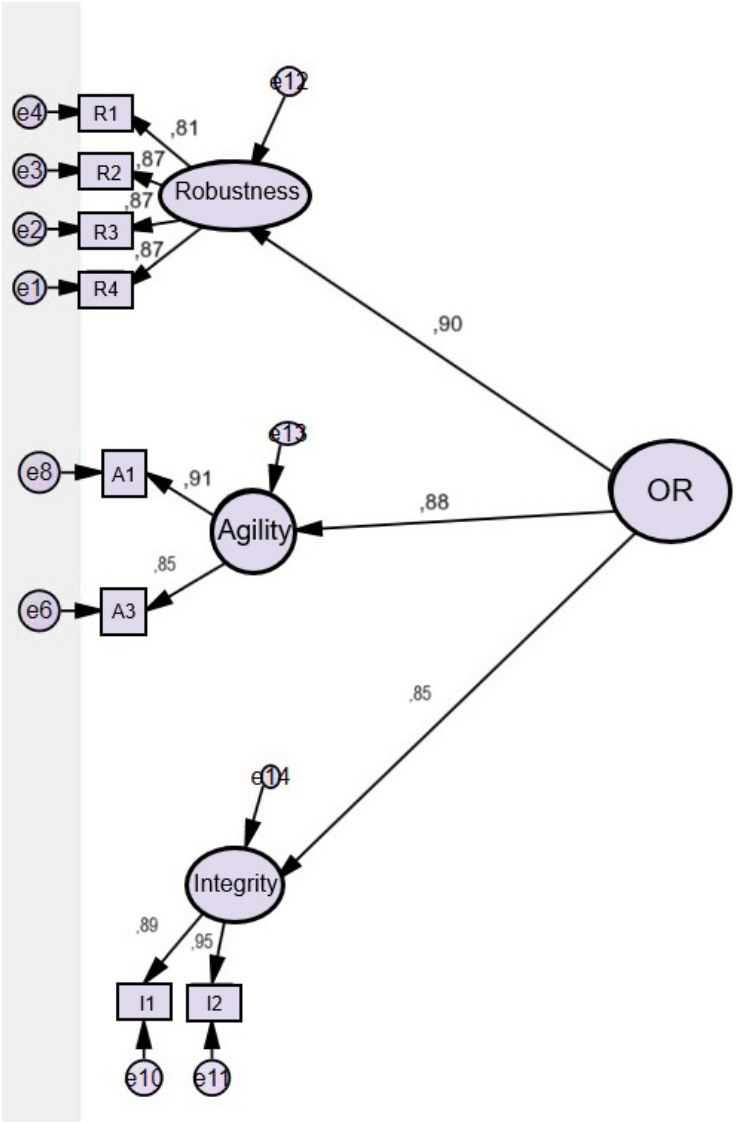

Figure 1. **Analysis of organizational resilience as a second-order factor**

Source: own study

A confirmatory factor analysis (CFA) of the overall measurement model was conducted after the second-order factor analysis of organizational resilience. The model showed good fit, with values of CMIN/DF = 2.930, p < .001; TLI = 0.936; IFI = 0.946; CFI = 0.945; and RMSEA = 0.079. Each of these indices satisfied the recommended thresholds, supporting the model's adequacy (Hair et al., 2010).

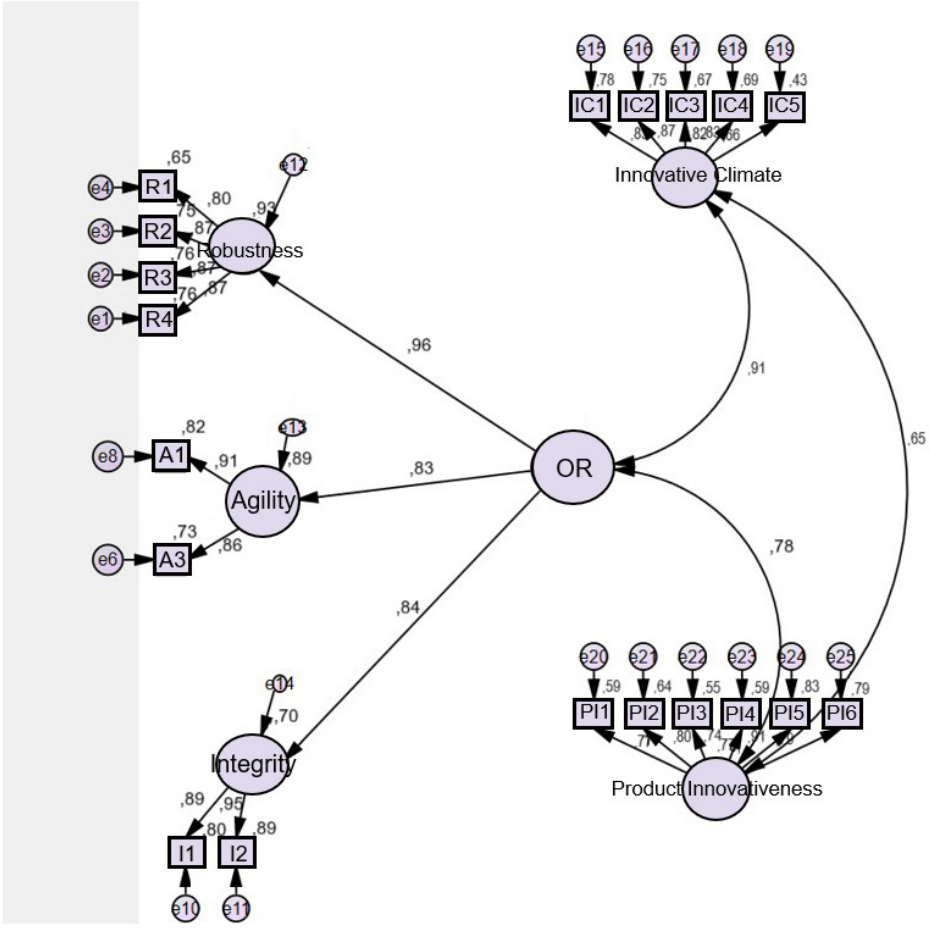

Figure 2. **DFA of overall measurement model**

Source: own study

Reliability and validity analyses of the scales were conducted by examining Cronbach's alpha, composite reliability (CR), average variance extracted (AVE), and item loadings (Fornell & Larcker, 1981; Hair et al., 2010). Table 3 indicates that Cronbach's alpha, CR, and AVE values surpassed the minimum acceptable levels. Convergent validity was confirmed since each item's factor loading was above 0.5.

Table 3. **Measurement of reliability and validity**

Constructs	Items	Factor loading	CR	AVE	Cronbach's Alpha
Robustness	R1	0.870	0.915	0.729	0.914
	R2	0.871			
	R3	0.869			
	R4	0.804			
Integrity	I1	0.894	0.874	0.777	0.916
	I2	0.946			
Agility	A1	0.856	0.917	0.847	0.872
	A3	0.905			
Innovative climate	IC1	0.885	0.907	0.664	0.903
	IC2	0.866			
	IC3	0.817			
	IC4	0.831			
	IC5	0.706			
Product innovativeness	PI1	0.769	0.923	0.666	0.923
	PI2	0.801			
	PI3	0.744			
	PI4	0.769			
	PI5	0.911			
	PI6	0.788			

Note: CR= Composite reliability; AVE= Average variance extracted
Source: own study

4.3. Hypotheses test

The bootstrapping analysis was conducted using the PROCESS macro for SPSS (Hayes, 2012). This method is particularly effective for estimating direct, and indirect, effects within a single analytical framework. It facilitates simultaneous testing of the overall model, incorporating mediation, (Edwards & Lambert, 2007; Preacher et al., 2007). Specifically, the technique developed by Preacher et al. (2007) was employed to test the mediating effect of organizational resilience on the relationship between innovative climate and product innovativeness.

Table 4 presents the regression analyses assessing the direct, indirect, and mediating relationships among product innovativeness, organizational resilience, and innovative climate. The results show that product innovativeness is positively and significantly associated with both innovative climate ($\beta = 0.608$, $SE = 0.044$, $t = 13.864$, $p < 0.001$, $R^2 = 0.384$, Adj. $R^2 = 0.382$) and organizational resilience ($\beta = 0.611$, $SE = 0.047$, $t = 8.276$, $p < 0.001$, $R^2 = 0.490$, Adj. $R^2 = 0.488$), thus supporting H1 and H2. In addition, innovative climate exerts a strong positive effect on organizational resilience ($\beta = 0.775$, SE = 0.031, t = 25.323, $p < 0.001$, $R^2 = 0.675$, Adj. $R^2 = 0.674$), thereby supporting H3.

When both innovative climate and organizational resilience are included as predictors of product innovativeness, the effect of innovative climate becomes statistically non-significant ($\beta = 0.134$, SE = 0.070, t = 1.928, p = 0.055), while organizational resilience remains a robust predictor ($\beta = 0.611$, SE = 0.074, t = 8.276, $p < 0.001$). In this combined model, the explained variance was $R^2 = 0.496$ and Adj. $R^2 = 0.492$. This shift in significance suggests a full mediation effect, whereby the influence of innovative climate on product innovativeness operates entirely through organizational resilience.

To evaluate the indirect effect, bootstrapping with 5,000 resamples was applied. The analysis indicated that the impact of innovative climate on product innovativeness through resilience was significant ($\beta = 0.473$, SE = 0.060, 95% CI [0.345, 0.585]), given that the confidence interval did not cross zero. This provides evidence for the mediating role of resilience in the proposed model, thereby confirming H4.

Table 4. **Regression results for simple mediation**

Variable	β	SE	t	p	R^2	Adj R^2
Direct And Total Effects						
Product innovativeness regressed on innovative climate	.608**	.044	13.864	.000	.384	.382
Product innovativeness regressed on organizational resilience	.611**	.047	8.276	.000	.490	.488

Organizational resilience regressed on innovative climate			.775**	.031	25.323	.000	.675	.674
Product innovativeness regressed on innovative climate and organizational resilience			inno climate: .134	.070	1.928	.055	.496	.492
org. resilience:.611 .074			8.276	.000				
Value		M	SE	LCL 95%CI	UCL 95%CI			
	Bootstrap results for indirect effect							
Value		.473	.060	.345	.585			
	Note(s): N = 311. Unstandardized regression results are reported. Bootstrap sample size = 5000. LCL = lower confidence limit; CI = confidence interval; UCL = upper confidence limit							

**: $p < 0.01$

Source: own study

5. Discussion

This study explores the intricate interrelationships among innovation climate, organizational resilience, and product innovation within firms operating in the chemical industry. The empirical findings demonstrate that innovation climate exerts a positive influence on organizational resilience, which in turn significantly contributes to product innovation. These findings are consistent with existing literature in the fields of organizational behavior, innovation management, and strategic management. By elucidating the mediating role of organizational resilience, the study offers a novel perspective and contributes to the integration of these research domains.

First, an examination of the descriptive statistics for the variables employed in the study indicates that participants generally hold moderately to highly positive perceptions. The robustness dimension of organizational resilience attained the highest mean value (M = 3.81), suggesting that employees perceive their organizations as particularly strong in their capacity to generate diverse solutions. By contrast, the mean values for agility (M = 3.47) and innovative climate (M = 3.49) reflect favorable but comparatively limited perceptions regarding the ability to adapt to change and to cultivate an innovative climate. Integrity (M = 3.35) and product innovation (M = 3.35) yielded the lowest means, implying a more cautious

evaluation of organizations in terms of acting with integrity and fostering product innovation. Collectively, these findings suggest that the resilience capacity of the firms in the sample is most pronounced in the robustness dimension, while areas such as agility, integrity, and innovative outputs present greater potential for improvement. The results indicate that an innovation climate—defined as the extent to which organizations encourage employees to generate novel ideas, take calculated risks, and devise creative solutions (Anderson & West, 1998)—not only enhances the firm's capacity for generating innovative products but also strengthens its adaptability and agility in the face of uncertainty. The positive association between innovation climate and organizational resilience suggests that fostering a culture of innovation enables organizations to restructure effectively and respond proactively to crises. Prior research has highlighted that climates conducive to creativity and innovation promote openness, flexibility, and collaboration among employees, thereby equipping organizations with the behavioral and cognitive resources needed to navigate environmental uncertainties (Amabile et al., 1996; Anderson & West, 1998). Empirical studies corroborate this relationship. For instance, previous research has consistently reported a positive link between innovation (or innovation climate) and organizational resilience (e.g., Mafabi et al., 2015; De Carvalho et al., 2016; Garrido-Moreno et al., 2024). In particular, a recent study by Chowdhury et al. (2025) confirmed the positive impact of innovation climate on organizational resilience within the Asian business context.

Previous research has also highlighted the mediating role of innovation climate in the relationship between various organizational factors and product innovation or firm performance. For instance, Erkmen et al. (2020) examined how sustainable IT capabilities influence firm performance, identifying innovation climate as a significant mediating factor that amplifies this relationship. Similarly, Yang and Entebang (2025), in their study of entrepreneurial leadership within new ventures in northeastern China, found that an innovation-supportive climate enhances the positive impact of leadership on innovation performance. Further supporting this line of inquiry, Song et al. (2020) demonstrated that environmental innovation practices foster product innovation performance through green creativity, where a creativity-conducive climate plays a central role. Dul and Ceylan (2014), focusing on the Turkish context, also provided evidence that a workplace environment that encourages creativity contributes positively to product innovation performance.

The present research additionally confirms a significant positive relationship between organizational resilience and product innovation. This finding aligns with earlier studies suggesting that resilient organizations are not only reactive structures capable of withstanding crises but are also proactive entities that leverage crises as opportunities for innovation and transformation (Lengnick-Hall et al., 2011). In this regard, the findings suggest that organizational resilience may serve as an important enabler in the

development of innovative products. This finding is further corroborated by evidence in the extant literature. First, resilient organizations exhibit the flexibility and capacity to innovate even during times of crisis. Whereas some businesses struggle to cope with crises, resilient firms are able to identify and capitalize on new opportunities. For instance, during the COVID-19 pandemic, organizations characterized by resilience were observed to leverage the crisis by developing new hygiene-related products, which experienced a sharp increase in demand. Thus, resilience not only enhances organizational survival but also fosters innovation through proactive behavior (You et al., 2023). This perspective is supported by empirical evidence. For example, a study conducted among accommodation businesses in Ghana found that organizational resilience positively influences innovation performance (Asare-Kyire et al., 2023). The study revealed that firms enhancing their resilience are more likely to engage in exploratory innovation—that is, the development of entirely new products, services, or business models that differ substantially from their existing offerings. Therefore, as argued in the present study, organizational resilience should be understood not only as a consequence of an innovation climate but also as a significant antecedent of product innovation.

Resilient firms tend to respond flexibly to challenges, optimize internal resources efficiently, and maintain continuity in their innovation processes even under adverse conditions. Empirical evidence also supports this argument. For example, Akgün and Keskin (2014) found that firms possessing a strong sense of purpose, clearly defined core values and vision, environmental awareness, and a psychologically safe and empowering climate achieve greater reliability in their product innovation processes. Similarly, Gemici et al. (2024) empirically validated the positive association between organizational resilience and product innovation in the Turkish business environment. Conversely, some studies have indicated a reverse relationship, wherein product innovation contributes to strengthening organizational resilience. Ahiauzu and Eketu (2015), for instance, found that product innovation significantly enhances a firm's resilience by reducing vulnerability and improving awareness and adaptive capacity. Likewise, Garrido-Moreno et al. (2024) provided empirical evidence suggesting that service innovation positively influences organizational resilience.

One of the key contributions of this study lies in identifying the mediating role of organizational resilience in the relationship between innovation climate and product innovation. This finding suggests that in organizational environments where employees are encouraged to generate novel ideas, risk-taking is supported, and a strong learning culture is cultivated, the organization's ability to cope with and adapt to uncertainty is enhanced. In turn, this heightened level of resilience facilitates and sustains product innovation efforts. Supporting this perspective, Gemici et al. (2024) investigated the influence of technology management capabilities on both organizational resilience and product innovation. Their findings indicated that technology management capabilities

significantly strengthen organizational resilience, which subsequently exerts a positive effect on product innovation.

To summarize, the findings of this study align closely with patterns identified in previous research (see Table 4). The strong effect of innovation climate on enhancing organizational resilience is consistent with the results reported by Chowdhury et al. (2025) and Mafabi et al. (2015). Likewise, the positive influence of organizational resilience on product innovation is supported by the studies of Zhang et al. (2025), Asare-Kyire et al. (2023), and Yu and Xiang (2025). This study further demonstrates that organizational resilience mediates the relationship between innovation climate and product innovation. This finding of full mediation is in line with the work of Dul and Ceylan (2014) and Acosta-Prado (2020), who highlight the indirect effects of innovation climate on innovation outcomes. Accordingly, the present study contributes new empirical evidence to the literature on the dynamics between innovation climate, organizational resilience, and product innovativeness, while also confirming that these relationships are consistently observed across diverse contexts.

Table 5. **Comparison of this study's findings with prior empirical evidence**

Relationship	This study (Turkish chemical sector, N=311)	Evidence from prior research
Innovation climate → Organizational resilience	Strong positive effect ($\beta = 0.775$, $p < 0.001$). Innovation climate enhances adaptability and robustness.	Chowdhury et al. (2025): Innovation climate significantly increases organizational resilience; employee resilience partially mediates this effect. (Context: Business organizations in Bangladesh). Mafabi et al. (2015): Creative climate directly strengthens resilience (Context: Public sector)
Organizational resilience → Product innovation	Positive and significant effect ($\beta = 0.611$, $p < 0.001$). Resilient firms maintain product innovation capacity even under crisis.	Zhang et al. (2025): OR had the strongest impact on product innovation among all tested variables. (Context: Technology firms in China). Asare-Kyire et al. (2023): OR significantly improves innovation performance in hospitality firms (Context: SMEs in Ghana). Yu & Xiang (2025): OR boosts team innovation performance. (Context: China)
Innovation climate → Product innovation (Direct)	Significant positive effect without mediator ($\beta = 0.608$, $p < 0.001$), but becomes non-significant when OR is included ($\beta = 0.134$, $p = 0.055$).	Dul & Ceylan (2014): Creativity-supportive climates increase new product success (Context: Turkey). Acosta-Prado (2020): Innovation climate enhances ambidextrous innovation capability (exploration & exploitation) (Context: Colombian new technology-based firms)

Innovation Climate **→ Product Innovation (via OR)**	Full mediation: indirect effect β = 0.473 (95% CI [0.345–0.585]). Innovation climate works through resilience to drive product innovation.	Yu & Xiang (2025): OR mediates the effect of transformational leadership on innovation outcomes (Context: China) - Chowdhury et al. (2025): Employee resilience mediates part of the IC→OR link, reinforcing resilience as a mediator in innovation processes (Context: Business organizations in Bangladesh)

IC: Innovation climate; OR: Organizational resilience

Source: own study

The findings of this study acquire heightened relevance when contextualized within Turkey's macroeconomic conditions in April 2025, the period during which the research was conducted. At that time, annual inflation remained at approximately 38%, while the Central Bank raised the policy rate to 46% in an effort to curb inflationary pressures and stabilize the Turkish Lira (focus-economics.com). Elevated inflation and tight monetary policies created an economic environment characterized by restricted access to financing and significant cost pressures on firms. Under such adverse conditions, cultivating an innovation-oriented climate within organizations provided a substantial advantage, as evidenced by the study's results showing that an innovation climate positively influences organizational resilience. By encouraging creativity and supporting the generation of new ideas, an innovative climate enhanced organizations' ability to adapt to economic fluctuations, thereby reinforcing their resilience. The findings further indicate that resilient organizations retain the capacity to develop new products and improve existing ones even amidst crises, demonstrating the direct positive effect of organizational resilience on product innovation. Moreover, an innovative culture was found to bolster resilience, facilitating the conversion of creative ideas into tangible product innovations. In conclusion, within the highly inflationary and volatile economic context of April 2025, firms fostering a strong innovative climate and organizational resilience are better positioned to sustain product innovation, ensure survival, and preserve their competitive advantage.

6. Conclusion

This study contributes to the Componential Theory of Creativity and the Dynamic Capabilities Theory. First, according to the Componential Theory of Creativity, organizational climate is a key factor that fosters creativity and innovation within organizations (Amabile, 1983; 1996). The finding of this study that innovation climate enhances employees' motivation to generate new ideas, take risks, and develop

creative solutions confirms the central role of the organizational climate component in supporting creativity and innovation as emphasized by the theory. Moreover, the mediating role of organizational resilience indicates that employees' creativity extends beyond the generation of ideas and becomes sustainable and applicable under crisis conditions. Thus, this study demonstrates that creativity is not confined to the individual level but also evolves into a systemic and sustainable outcome through organizational resilience, thereby reinforcing the validity of the Componential Theory of Creativity at the organizational level.

Second, the Dynamic Capabilities Theory posits that organizations must possess the capabilities of sensing, seizing, and transforming/reconfiguring in order to sustain competitive advantage in changing environmental conditions (Teece et al., 1997). The findings of this study show that innovation climate facilitates organizations' ability to "sense" environmental uncertainty, while organizational resilience supports the processes of responding swiftly to uncertainty, seizing opportunities by effectively utilizing resources, and transforming the organizational structure. In particular, the positive effect of organizational resilience on product innovation demonstrates that dynamic capabilities not only act as a defense mechanism against crises but also serve as a proactive driver of innovative outcomes. Accordingly, by empirically examining the sensing, seizing, and transforming dimensions proposed by the Dynamic Capabilities Theory within the framework of innovation climate and organizational resilience, this study strengthens the established link between the theory and innovation performance.

In light of the findings of this study, several practical recommendations can be offered to enhance organizational resilience and innovation capacity. Practitioners are advised to adopt a proactive stance toward change by developing contingency plans and scenario-based strategies to address potential uncertainties and crises.

It is also imperative that organizational leaders take an active role in guiding resilience-building efforts. This includes cultivating a psychologically safe work environment in which employees feel empowered to express their ideas freely, promoting a culture where mistakes are viewed as learning opportunities, and recognizing and rewarding creative contributions. Such leadership practices not only support individual well-being but also enhance collective organizational adaptability.

Particularly in dynamic and high-velocity industries such as the chemical sector, where continuous change and uncertainty are prevalent, organizations should prioritize capacity-building in areas such as problem solving, creativity, and collaboration through targeted training and development programs. Additionally, fostering an internal culture of effective communication can serve as a critical mechanism for simultaneously reinforcing organizational resilience and nurturing a supportive innovation climate. In this context, it becomes essential for managers to cultivate organizational environments characterized by open communication, psychological safety, a strong learning orientation, and flexible organizational structures. These elements collectively serve to reinforce both

innovation climate and organizational resilience, thereby supporting continuous and crisis-resistant innovation processes.

The scope of this research is limited by several factors that should be acknowledged when interpreting the findings. First, the study was conducted exclusively within firms operating in the chemical industry, which constrains the generalizability of the results to other sectors. Additionally, the use of a cross-sectional research design precludes the ability to draw definitive conclusions about causal relationships among the variables examined.

The data were collected through self-reported surveys, relying on participants' subjective perceptions. This approach introduces the potential for common method bias and may affect the objectivity of the findings. Moreover, the study was carried out within the context of Turkish organizational and sociocultural norms, and cultural variability across different national or regional contexts was not considered. As such, the influence of cross-cultural factors on the observed relationships remains unexamined, limiting the study's applicability to broader, international settings.

Another limitation concerns the absence of additional control variables that are often considered important predictors of product innovation, such as access to resources and technology, leadership style, or employee motivation. In this study, the primary objective was to test the mediating role of organizational resilience in the link between innovation climate and product innovation, and therefore such controls were not incorporated into the research model. Future research, however, should account for these variables in order to more clearly isolate the unique contribution of organizational resilience relative to other well-established determinants of product innovation.

A limitation of this study is that organizational-level constructs such as innovation climate and organizational resilience were measured at the individual level. This approach, while widely used in prior research, may restrict the extent to which the findings can be generalized to the organizational level.

In this study, in order to preserve the parsimony of the model, other control variables that may influence product innovation (e.g., access to resources, leadership style, employee motivation) were not incorporated into the analysis. Nevertheless, the omission of these variables constitutes a limitation of the study. Future research that includes such control variables would enhance both the generalizability of the findings and the explanatory power of the model.

Future research could benefit from the use of longitudinal designs to explore the dynamic effects of organizational resilience and innovation over time. Such an approach would allow for a more robust examination of causality and the temporal evolution of these constructs. Additionally, extending the research to include diverse sectors would enable cross-sectoral comparisons, offering insights into which industries are more responsive or vulnerable to factors related to resilience and innovation.

Moreover, incorporating qualitative methodologies—such as in-depth interviews, focus groups, or case studies—could enrich the understanding of underlying mechanisms and provide contextualized insights that quantitative methods may overlook. Future studies may also consider examining the influence of different leadership styles on the relationship between innovation climate and organizational resilience. Similarly, the role of organizational culture in shaping or moderating this relationship represents a promising avenue for further investigation.

Although this study provides a extensive review of the current literature, it does not employ a systematic literature review (SLR) method. This absence limits the objective and holistic assessment of all academic publications on the subject. Accordingly, the lack of an SLR should be acknowledged as a theoretical limitation of the study, and future research is encouraged to adopt this method in order to offer a more comprehensive and in-depth framework.

The empirical findings reveal that an innovation climate exerts a direct, significant, and positive influence on both organizational resilience and product innovation within chemical industry firms. Moreover, organizational resilience is confirmed to function as a critical mediating mechanism in the relationship between innovation climate and product innovation. By enhancing adaptive capacity, an innovation-supportive climate facilitates accelerated new product development processes. Taken together, the joint presence of innovation climate and organizational resilience can constitute an integrated set of dynamic capabilities that enable firms to recover stronger from crises and to sustain their competitive advantage.

Authors' contribution

H.G.C: article conception, theoretical content of the article, research methods applied, conducting the research, analysis and interpretation of results, draft manuscript preparation. **T.U.:** article conception, theoretical content of the article. **A.K.:** article conception, theoretical content of the article, research methods applied, conducting the research, data collection, analysis and interpretation of results. **A.G.:** research methods applied, conducting the research, data collection, analysis and interpretation of results, draft manuscript preparation. **J.B.:** research methods applied, conducting the research, data collection, analysis and interpretation of results, draft manuscript preparation.

Declaration of Generative AI and AI-assisted technologies in the writing process

During the preparation of this work the authors used Chatgpt for English translation and language editing. After using this tool/service, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

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Appendix

Product Innovativeness Scale (Akgün and Keskin, 2014)

- In new product and service introductions, our firm is often first to market.
- Our new products and services are often perceived as novel by customers.
- New products and services in our company often put us up against new competitors.
- Our recent new products and services are major changes from our previous products and services.
- In comparison with competitors, our company has introduced more innovative products and services during the past five years.
- In comparison with competitors, our company is faster in bringing new products or services to the market.

Organizational Resilience Scale (Kantur and Say, 2015)

Robustness:

- Our organization is successful in generating diverse solutions
- Our organization stands straight and preserves its position.
- Our organization shows resistance to the end in order not to lose.
- Our organization does not give up and continues its path.

Agility:

- Our organization rapidly takes action.
- Our organization develops alternatives in order to benefit from negative circumstances.
- Our organization is agile in taking required action when needed.

Integrity:
- Our organization is a place where all the employees engaged to do what is required from them.
- Our organization is successful in acting as a whole with all of its employees

Innovation Climate (Malik and Wilson, 1995):
- This organization is always moving toward the development of new answers.
- This organization can be described as flexible and continually adapting to change.
- People in this organization are always searching for fresh, new ways of looking at problems.
- Creativity is encouraged here.
- This organization seems to place a high value on taking risks, even if there are occasional mistakes.