"The Role of Entrepreneurial Intensity in Enhancing Business Resilience of Manufacturing Companies Producing Construction Materials: Evidence from Kurdistan Region – Iraq"

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ABSTRACT:

This study examines the role of entrepreneurial intensity on business resilience amongst manufacturing firms producing construction materials within the Kurdistan Region of Iraq. Using a deductive, quantitative, and survey strategy, information was collected through a questionnaire from 553 managers of the companies mentioned above; 416 questionnaires were deemed valid for analysis, indicating a response rate of 84.9%. These responses were analyzed through Partial Least Squares Structural Equation Modelling (PLS-SEM). Entrepreneurial intensity was assessed through two dimensions: the degree of entrepreneurship (innovativeness, risk-taking, and proactiveness) and the frequency of entrepreneurship. business resilience was measured by organizational robustness, readiness, response, and recovery. Results provide a strong positive relationship between entrepreneurial intensity and business resilience, with proactiveness and innovativeness showing the strongest effects. This study contributes theoretically by conceptualizing entrepreneurial intensity as a multidimensional construct and practical implications for managers to strengthen resilience. Limitations include geographic scope, reliance on self-reported data, and the cross-sectional design. Future research should explore broader industry applications and longitudinal data.

Key words: Entrepreneurial Intensity, Business Resilience, Manufacturing Companies Producing Construction Materials in Kurdistan Region.

1 INTRODUCTION

In today's intense and agonistic business landscape, companies must adapt to sustain operations and improve growth. entrepreneurial intensity is a crucial term of organizational performance and resilience in extremely competitive environments. Specifically, it represents the degree of entrepreneurial potential to acknowledge and take advantage of possibilities to participate in entrepreneurial activity [1]. Thus, comprehending entrepreneurial intensity is crucial for attaining outstanding company performance, promoting innovation, and facilitating internationalization initiatives [2]. From this perspective, entrepreneurial intensity is described as the degree of attention, commitment, and entrepreneurial inclination presented by individuals inside a company to the creation of creative organizations [3]. This notion is constructed on the assumption of responsiveness, risk-taking, and distinctiveness, stressing its diverse components [4]. Here**,** it is worth mentioning that manufacturing companies in Erbil have accepted risk-taking techniques by investing in innovative devices to increase production capacity despite economic challenges [5]. This illustrates the significance of entrepreneurial intensity in promoting renovation and guaranteeing organizational adaptation.

Furthermore, entrepreneurial intensity provides a conceptual structure for evaluating entrepreneurial activities, assists businesses with organizing their processes, consolidating approaches, and producing sustained success [6]. It encourages organizations to go beyond incremental changes to operate in dynamic sectors or regions, where traditional approaches may no longer yield results [7]. In most cases, it enhances flexibility and progress in businesses facing resource

constraints, enabling them to overcome challenges, capitalize on opportunities, and achieve sustained growth [8]. It is the level of entrepreneurship in an organization, firm, industry, or economy and the degree of entrepreneurial activity [9].

Similarly, business resilience has progressed as a significant organizational component, particularly in crisis-prone and unforeseen circumstances. It illustrates an organization's potential to adapt and recover from significant crises or disturbances [10]. Business resilience incorporates reactive and promotional methods to continue services as well as discover growth possibilities under difficult circumstances [11]. It involves preserving processes throughout important occurrences, assuring ongoing operations, and preserving company resources [12]. Business resilience is essential for organizations to adapt to disruptions, maintain continuity, and drive long-term sustainability by stimulating innovation, flexibility, and learning from experiences [13]. Business resilience enables companies to adapt by preserving internal resilience while also providing chances to promote it externally, which benefits both the company and its surroundings [14]. Its importance is in ensuring the compatibility of internal strengths with the strategic objectives of a business, which promotes modification, creativity, and seizing opportunities for growth [15].

Hence, Business resilience is specifically significant for developing organizations and inventors to react to technological restructuring, modify customer requirements, and deal with uncertain market circumstances [16]. Business resilience is firmly associated with constant creativity in responding to changing conditions and client attitudes [17]. Business resilience refers to an organization's capability to quickly respond to trouble while maintaining continuous business operations and protecting people, benefits, and total brand equity [18]. As a consequence, resilience is a fundamental notion in crisis management that allows businesses to successfully deal with a range of issues [19]. Furthermore, the procedure of strategic leadership methods, especially Total Quality Management (TQM) and Balanced Scorecard (BSC), has been associated with increased productivity among Iraq's industrial enterprises [20]. In this area, structures promote effective efficiency and flexibility, which is fundamental to improving resilience in Kurdistan's industrial industry amid financial and logistical obstacles [21]. Creativity facilitates the connection between cooperative structures and data communication, which is essential in establishing resilience in industry [22].

Considering "the role of entrepreneurial intensity in increasing business resilience affords important information for manufacturing enterprises in Iraq's Kurdistan Region". By promoting innovation, strategic cohesiveness, and adaptability, these organizations efficiently navigate problems, maintain processes, and attain long-term success. Thus, the aim of this research is to examine the relationship between entrepreneurial intensity and business resilience, as well as to provide a structure to guide organizational development in an active and competitive setting.

1.2 PROBLEM STATEMENT

The Kurdistan Region of Iraq (KRG) has recently experienced outstanding economic growth, especially in the manufacturing of building materials, which performs a critical role in the region's economic progress [23]. However, despite this progress, the sector encounters a multitude of challenges, including limited human capital, supply chain disruptions, and shifting regulatory environments [24, 25]. These problems often result in project delays, and overcoming these barriers is a strategic priority.

While current studies have identified the influence of characteristics such as entrepreneurial mentality and environmental circumstances on entrepreneurial objectives [26]. Entrepreneurial intensity, sometimes defined as a quantity of entrepreneurial activity and an important factor in organizational adaptation, creativity, and success, in particular in competitive and unpredictable situations [27]. However, in despite of its theoretical importance, there is no universally accepted model for measuring and understanding the structure of entrepreneurial intensity, and this applies to companies producing construction materials [28]. At the same time, business resilience is increasingly recognized as critical for long-term survival and profitable growth and strategic agility [29]. While studies have highlighted the importance of entrepreneurial behavior and creative abilities in creating resilience, particularly in the construction materials sector [30, 31]. Furthermore, most research has focused on innovation capacity, ignoring the specific contribution that frequency and degree of entrepreneurship make to improve organizational resilience, responsiveness, and recovery capabilities [32, 33].

With increased competition and weaknesses like dependence on imported materials, changing regulations, and unpredictable market demand, manufacturing companies in the Kurdistan Region, especially those making construction materials, need strategies that emphasize long-term goals rather than just short-term ones. Nevertheless, there remains a significant empirical gap in understanding the mechanisms by which entrepreneurial intensity contributes to business resilience in this specific industrial and regional context. In response to this gap, this study aims to address this important gap by empirically investigating the role of entrepreneurial intensity through its main dimensions of entrepreneurial frequency and degree of entrepreneurship estimated by three sub-dimensions: innovation, risk-taking, and proactivity in enhancing business resilience. Consequently, the paper offers both theoretical contributions to the entrepreneurship and resilience literature as well as practical insights for policymakers and industrial decision-makers seeking to strengthen the sustainability and adaptability of key manufacturing sectors in developing and post-conflict economies.

2 LITERATURE REVIEW

2.1 ENTREPRENEURIAL INTENSITY

Entrepreneurial intensity refers to the level of a firm's entrepreneurial activity at a given point in time, which can serve as a foundation for shaping and guiding the organization's corporate entrepreneurial strategy. Notably, the term "entrepreneurial intensity" was first used by Morris and Sexton [34] to describe the variation in entrepreneurial activity within and between organizations. Furthermore, according to Kuratko [35], entrepreneurial intensity reflects the overall level of the degree and frequency of entrepreneurial actions illustrated by an individual or organization. In this connection, Heilbrunn [36] asserts that entrepreneurial intensity refers to the degree and frequency of entrepreneurial activity that comprises the variables of the entrepreneurial intensity. Meanwhile, entrepreneurial intensity based on frequency and degree requires a combination of qualitative aspects like innovation and strategic influence.

Likewise, entrepreneurial intensity is defined as a function of the degree, which is the extent to which any one event is innovative, risky, and proactive, and frequency of entrepreneurship refers to the number of times organizations act entrepreneurially. In the light of this perspective, entrepreneurial intensity is an integration of degree and frequency, which is a beneficial structure for the significance of strategic alignment with objectives and responding to market changes [37-41]. In this context, Urban and Mgwenya [42] view entrepreneurial intensity as the scale of entrepreneurship at the organizational level, taking into account the degree and frequency of events with respect to innovativeness, risk, and proactiveness. Furthermore, this definition emphasizes organizational diversity in the application of entrepreneurial intensity, which highlights the variety of entrepreneurial intensity and its importance in various business settings.

Entrepreneurial intensity plays a significant role in career development and employability, which are highly valued, and those with a strong entrepreneurial intensity are more flexible in dealing with altering circumstances at work [43]. However, entrepreneurial intensity enhances career growth and flexibility and can neglect the value of collaboration and emotional balance, thereby underscoring the need for a more encompassing approach to workplace success. Entrepreneurial intensity is extremely connected to promoting innovation, as the probability of developing new and creative products or services increases with the strength of entrepreneurial operation [44]. As a consequence, it is significant because, as described and presented by Kuratko, et al. [45]. It provides an advanced method to analyze an organization's entrepreneurial activities, offering insight into how regularly and skillfully a firm seeks innovation and development. In addition, it is based on innovation and growth [46]. Overall, these perspectives highlight entrepreneurial intensity's significance to external changes and developing a culture of creative growth, which strengthens an organization's competitiveness over time.

Here, it is worth mentioning that entrepreneurial intensity has a considerable favorable influence on total business success, both domestically and internationally [47]. Similarly, entrepreneurial intensity is vital to constructing and integrating knowledge processes and impacting business success. In particular, it provides an innovative means for organizations to create skills and retain a competitive advantage in the marketplace [39]. Taken together, these perspectives illustrate how entrepreneurial intensity increases essential abilities for operating a strong, competitive organization.

Certainly, entrepreneurial intensity is also crucial from the perspective of Krauss, et al. [48] in encouraging globalization, which encourages entrepreneurial behaviors and strengthening economic development and creates employment. Furthermore, entrepreneurial intensity provides a larger economic influence, affecting growth and employment strategy as well as having a favorable impact on many financial goals, emphasizing its relevance to both enterprises and the whole economy [49].). Upon the researcher's viewpoint, both views agree on entrepreneurial intensity's economic impact; one focuses on global opportunity leverage, while the other highlights internal growth and employment strategies that enhance individual business performance and contribute to broader economic goals. Then, entrepreneurial intensity is considered the best predictor of entrepreneurial action and purpose, which allows them to gain knowledge about their chances of establishing a firm [50]. This has crucial implications for anticipating entrepreneurial conduct and developing research and practice in entrepreneurship.

However, entrepreneurial intensity is focusing on discovering, identifying, obtaining, and utilizing important resources for new business formation [51]. In essence, this attribute increases strategic insight and enables immediate, successful implementation, leading to enhanced business outcomes. Entrepreneurial intensity involves two dimensions: the degree and frequency of entrepreneurial activities within an organization [52]. When shown, the frequency of entrepreneurship refers to how often organization engages in entrepreneurial activities, while the degree of entrepreneurship, equivalent to EO, is measured by three sub-dimensions: innovativeness, risk-taking, and proactiveness [53]. Specifically, the first dimension, innovativeness, refers to the construction of new products, services, and technologies. Meanwhile, the second dimension, risk-taking, involves the willingness to commit significant resources to opportunities having a reasonable chance of costly failure. Lastly, the third dimension, proactiveness, reflects top management's orientation in pursuing enhanced competitiveness and includes initiative, competitive aggressiveness, and boldness [54-58].

2.2 BUSINESS RESILIENCE

Initially, resilience was referred to as a notion in the field of physics (Vargas and Rivera [59], but over time, resilience led to changes in other fields such as business and management. It was first introduced in the business context by Staw (1981), who advanced this idea within the framework of evolutionary theory. In general, resilience is one of the characteristics that organizations want to have, both by their members and by the organization itself, to deal with different types of difficulties [60]. Above all, in the light of this perspective, resilience in business signifies a progressive methodology, highlighting the necessity for adaptive strategies that enhance organizations' capacity to negotiate instabilities to augment overall organizational strength.

Furthermore, according to Martinelli, et al. [61], business resilience refers to an organization's ability to predicate, prepare for, respond to, and recover from disruptions, thereby ensuring its continuity and adaptability to unforeseen challenges. From the researcher's perspective, this concept holds significant value, but it could be more effective to incorporate proactive development for resilience and strategic advancement. Also, it is valuable to maintain another notion of BR, which was presented by Sadeqi-Arani and Alidoust Ghahfarokhi [62] as the structural and systematic capacity of the firm to withstand crises in challenging situations. As mentioned above, this concept stresses structural capacity and reflects the significance of adaptation and creativity in actual resilience.

Hence, Kotsios [63] defines business resilience as having the ability to anticipate, avoid, and adjust to shocks in their environment. Overall, Lestari, et al. [64] argue that this concept stresses a proactive approach to resilience, which may promote avoidance of danger over creativity and adaptation. In essence, business resilience reflects an organization's capacity through innovation, adaptability, and strategic robustness. In the researchers' opinion, this description accurately emphasizes the growth of resilience and continuous improvement and the complexity of implementation. Furthermore, the unexpected impacts of globalization and economic instability have recently generated interest in business resilience [65]. As a result, business resilience has become critical for the owners of companies because they must discover strategies to keep their business functioning in the face of challenging circumstances [66]. Given the aforementioned statements, both perspectives underscore the growing significance of company resilience in the face of global obstacles that impact business dynamics, particularly for rebuilding and sustaining operations in challenging situations.

Above all, the growth of business resilience is vital in cases of crisis, stressing the key importance of resilience as an organization's capacity for invention and growth in the face of adversity [67]. On the other hand, Sin, et al. [68] state that business resilience is not mainly about managing disturbance, but also about taking advantage of catastrophes as possibilities for development and progress, which enhance the organization's adaptability. Upon the researchers' view, both expressions highlight the essential function of company; the first emphasizes preservation and expansion, whereas the second, proposed by Sin, et al. [68], focuses on transformation and proactive adaptation under crisis. Otherwise, business resilience , referred to by Korber and McNaughton [69], especially through an entrepreneurial strategy, is crucial because it promotes resilience at both the business and human levels. Here, the researchers believe that perseverance is important for entrepreneurs to ensure long-term success as they seize opportunities for growth and transformation.

Business resilience enables organizations, especially smaller ones, to become responsive and sensitive to external factors like economic instability or interruptions [70]. Meanwhile, businesses in a progressively connected world face challenges and business resilience helps organizations manage these difficulties, strengthening their capacity to survive in a complicated world economy [63]. Similarly, business resilience enables organizations to become responsive and sensitive to external factors like economic instability or interruptions [71]. Although they all recognize the significance of business resilience in their sustenance, they vary in their emphasis on firm size, the nature of difficulties, and the integration of the technology. Specifically, the first highlights resilience as crucial for small businesses to deal with critical fluctuations. In contrast, the second expands this perspective, emphasizing resilience in managing both local and global difficulties within a complex economy. Furthermore, the third element combines resilience with competitive advantage and operational stability in the global market, demonstrating that technology improves this capacity.

To demonstrate, the literature describes business resilience by Sundarakani and Onyia [72] in a variety of dimensions and components. Broadly defined, business resilience has been defined as an organization's capacity to avoid and accept alters and resume its original performance level following an unanticipated disruption. In this regard, researchers have proposed various dimensions that emphasize different aspects of resilience. For example, key components such as agility, robustness, flexibility, and management of vulnerabilities are widely recognized as enhancing an organization's potentiality to withstand disruptions [73].

In addition, Rai, et al. [74] highlight that critical factors, including crisis anticipation, organizational sturdiness, and recoverability are deemed essential for ensuring effective preparation and recovery during crisis expectation, organizational resilience, and restoration. Furthermore, Zayed, et al. [75] identified categories like capital resilience, relationship resilience, cultural resilience, strategic resilience, and learning resilience, which highlights both tangible and intangible aspects crucial for adaptation. Building on these insights, this study adopts the four dimension proposed by [76], organizational robustness is the capacity to be proactively develop risk management strategies and adapt to modifies

to reduce the effects of the disrupted crises, readiness comprises the ability to apply different strategies that address weaknesses and the capacity to utilize resources rapidly and efficiently when a crisis occurs, response it involves applying crisis management methods into action, making critical decisions under pressure, and communicating with stakeholders., and recovery focuses on restoring an organization's stability and functionality after a disruption.. These dimensions provide a comprehensive perspective on the critical ability's businesses need to overcome challenges effectively.

2.3 THE RELATIONSHIP BETWEEN ENTREPRENEURIAL INTENSITY AND BUSINESS RESILIENCE

Entrepreneurial intensity is composed of the degree level of inventiveness, risk-taking, proactiveness, and the frequency of entrepreneurial activities to promote innovation and strategy regrowth. [77]. On the other side, business resilience assists organizations in overcoming adversity by promoting flexibility, rearrangement, and development [78]. Furthermore, research by Abdesselam, et al. [79] it implies that economies with a greater entrepreneurial intensity exhibit descriptive creative thinking as well as stimulate enterprises to innovate and succeed, thereby ensuring financial stability and resilience. Conversely, countries with low entrepreneurial intensity have limited development and resilience prospects. Therefore, entrepreneurial intensity is a fundamental measurement of economic stability and recovery to achieve business resilience.

The study by Riso and Morrone [80] supports the notion that entrepreneurial intensity reveals a level of dedication and focus on entrepreneurship for organizations to actively confront unpredictability and capitalize on opportunities, which is important to constructing resilience. Therefore, entrepreneurial intensity improves long-term development by emphasizing resilience and motivates the execution of effective techniques and practices, such as digital technology, which increase an organization's capacity to continue procedures and recover from disasters.
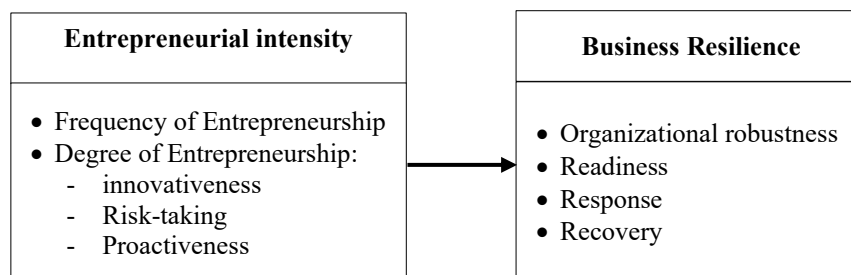
In this connection, the study of Thousani and Edy [81] promotes a proactive attitude, permitting entrepreneurs to adapt and grow during times of challenges to overcome uncertainty by developing resilience and self-confidence. Furthermore, having access to education, training, and financial assistance needed to construct great organizations and enhance resilience to overcome obstacles, and maintain success. Finally, higher levels of entrepreneurial intensity promote resilience, setting the framework for long-term success and strength.

On the other hand, Zaenuri, et al. [82] argue that entrepreneurs execute change through resilience, which is defined by skills, readiness, abilities, and routines to capitalize on opportunities to take on additional positions, resulting in increased entrepreneurial intensity. In addition, resilience promotes a predictable and responsive perspective with the dynamic and powerful character of entrepreneurial intensity, ensuring consumers remain inspired and persistent in their entrepreneurial pursuits.

More precisely, Ukabuduzhiimkpa and Onuoha [83] assert that entrepreneurial intensity includes creative and innovative attempts which substantially improve an organization's flexibility and operational effectiveness to enhance organizational resilience to predict and deal effectively. Furthermore, entrepreneurial intensity is associated with essential performance measures to cope with unexpected events. Basically, organizations that integrate entrepreneurial ideas into their planning processes improve their adaptability, assuring long-term success and a strategic advantage in uncertain conditions. In this context, Verkhovskaya, et al. [84] believe that skilled entrepreneurs use individual competencies to strengthen their resilience in challenging circumstances that are both flexible and customer-focused. This combination of entrepreneurial intensity with digital innovation not only develops a company's capabilities, but it also encourages long-term success through strategic adaptability and a concentration on customer demands. Additionally, entrepreneurial intensity also acts as a significant supporter of resilience, providing businesses with the skills and mindset required to negotiate and function in challenging situations.

Overall, the relationship between entrepreneurial intensity and business resilience indicates a strategic alignment to effectively change resources and adjust to changing market demands, permitting organizations to adapt and survive in unanticipated circumstances. Entrepreneurial intensity, via its degree dimension, innovation, risk-taking, and proactiveness, improves a company's adaptability, response to changes and enhances awareness and strategy renewal. Together, these elements promote an entrepreneurial mindset that improves fundamental resilience components, including organizational robustness, readiness, reaction, and recovery. Consequently, this relationship emphasizes entrepreneurial intensity's importance in developing adaptive capacities that guarantee long-term competitiveness and maintain performance in dynamic business environments characterized by constant shifts and inconsistency.

Entrepreneurial intensity	Business Resilience

• Frequency of Entrepreneurship
• Degree of Entrepreneurship:
  - innovativeness
  - Risk-taking
  - Proactiveness
	• Organizational robustness
	• Readiness
	• Response
	• Recovery

FIGURE 1. The Theoretical Framework

Figure 1 illustrates the theoretical framework of the relationship between entrepreneurial intensity and business resilience. This figure also indicates the existence of a significant and positive impact of entrepreneurial density (along with its various dimensions) on business resilience.

METHODOLOGY

This study adopted a positivist philosophy, emphasizing objectivity, empirical measurement, and hypothesis testing through quantitative methods [85]. A deductive reasoning approach was employed, beginning with existing literature to test the relationship between entrepreneurial intensity (independent variable) and business resilience (dependent variable). A descriptive and correlational research design, in data collection in this investigation was directed through the division of a self-administered questionnaire. In addition, based on previous literature, we adopted validated scales to measure the two variables of the study. The questionnaire consists of forty-eight questions divided into three parts. To elaborate, the first part consists of four questions, which were mainly information about the company. The second part consists of six questions, which were mainly information about the respondents. The third part consists of thirty-eight questions related to the main study variables, with 16 questions on entrepreneurial intensity and 22 questions on business resilience.

The measuring indicators of the constructs were adapted from established previous studies to fit the research contexts. All items were measured using a five-point Likert scale, ranging from (1) "Strongly Disagree" to (5) "Strongly Agree". The scale used to measure entrepreneurial intensity was accepted from Scheepers [77] and therefore comprises two main dimensions: frequency of entrepreneurship and degree of entrepreneurship, with the latter of which is assessed through three sub-dimensions: innovativeness, risk-taking, and proactiveness; notably, each sub-dimension contains four questions, along with four questions for the frequency of entrepreneurship. Regarding business resilience, we adopted the four-dimensional scale from Putritamara, et al. [76]. Specifically, the first dimension, organizational robustness, includes six questions; the second, readiness, is measured by four questions; the third, response, contains eight questions; and finally, the fourth dimension, recovery, comprises four questions.

The questionnaire was presented to the respondents in three languages, namely English, Arabic, and Kurdish. In addition, the face validity of the questionnaire was checked by a panel of experts in the area, and based on their feedback, some questions were rephrased to be more understandable and expressive. Consequently, the length of the questionnaire was prolonged from the initial forty-five questions to the forty-eight questions as explained above.

The target population of this research includes company managers, assistant managers, heads of departments, and unit managers within manufacturing companies producing construction materials in the Kurdistan region of Iraq. This group is considered most relevant for the study, as they are directly involved in entrepreneurial activities and strategic decision-making processes that influence the level of entrepreneurial intensity and the resilience of their respective businesses. Furthermore, we limited the area of study to the Kurdistan region only to ensure the most possible consistency of the study population, since companies in this geographic area typically operate under similar economic, political, and institutional conditions. This, in turn, helps minimize external variability and enhance the comparability of results.

Due to the nature of the study and the time and resource constraints, probability sampling techniques were considered deemed impractical. Therefore, we adopted a non-probability sampling technique, specifically convenience sampling, and data were collected using a structured, self-administered questionnaire delivered through two main channels. The first method involved personal visits to the company premises where printed copies were handed directly to respondents and then collected. The second method involved electronic distribution through Google Forms using popular digital platforms such as WhatsApp, Facebook Messenger, and Instagram, which are used widely in the region. Together, these two methods facilitated rapid and broad distribution of the survey, particularly in areas where face-to-face access was constrained. The data collection period extended over almost three months, from 15th March 2025 to 5th June 2025, and during this time, we received a total of 421 responses. Participants completed the questionnaire voluntarily. However,

five respondents were removed as the respondents were residing outside the geographical area of the study. Consequently, 416 completed responses were analyzed.

4 RESULTS AND DISCUSSION

4.1 DATA ANALYSIS

The variance-based partial least squares structural equation modeling (PLSSEM) method was utilized to analyze the gathered data and evaluate the research hypotheses, employing the Smart PLS 4.1.0.9 software package. The selection of PLS-SEM was considered optimal for this study, as its main objective is to investigate the influence of entrepreneurial intensity on improving business resilience in manufacturing firms that produce building materials, particularly in the Kurdistan Region of Iraq. This methodological approach align with corresponds with the intricate nature of the research model, which includes multiple constructs such as entrepreneurial intensity, a higher-order construct that encompasses both the degree of entrepreneurship (comprising innovativeness, risk-taking, and proactiveness) and the frequency of entrepreneurship, and business resilience, which consists of organizational robustness, readiness, response, and recovery. In addition, the ability of PLS-SEM to proficiently handle non-normal data distributions and small-to-medium sample sizes further substantiates its choice for the present analysis [86].

4.2 SAMPLE CHARACTERISTICS

Table 1 illustrates the demographic and company profile of the 416 respondents of the construction materials sector in the Kurdistan region of Iraq, revealing a predominant presence from Erbil (44.7%), followed by Sulaymaniyah (27.2%) and Duhok (24.3%). Most businesses operate within the local market in Kurdistan (78.1%), with limited national (13%) and international (8.9%) outreach. The predominant building materials produced are bricks (25.7%) and cement (22.1%), followed by steel (21.2%). The workforce is overwhelmingly male (90.1%) and primarily aged between 31 and 45 years (45.9%), reflecting a mature and gender-imbalanced labor force. The highest educational credentials were observed among undergraduates (43.3%), with fewer holding diplomas (18.3%) or postgraduate (8.9%) qualifications. The majority of participants held professional roles, company managers (40.4%) and assistant managers (20.7%), followed by heads of departments (20. 0%). The majority of respondents possessed significant experience, with 48.6% having been employed by their companies for more than 10 years. Similarly, in terms of their current job position, 48.8% have been in their current role for more than 7 years, indicating an experienced leadership base operating within a predominantly local and traditional market environment.

Table 1. Information about the respondents and companies being researched (n = 416)

Variables	Subgroup	Count	%
Governorate	Erbil	186	44.7%
	Duhok	101	24.3%
	Sulaymaniyah	113	27.2%
	Halabja	16	3.8%
The Primary Market Scope	Local (within Kurdistan)	325	78.1%
	National (within Iraq)	54	13.0%
	International	37	8.9%
Type of Construction Material	Cement	92	22.1%
	Steel	88	21.2%
	Brick	107	25.7%
	Concrete	65	15.6%
	Marble and Tile	46	11.1%
	Pipe	18	4.3%
Sex	Male	375	90.1%
	Female	41	9.9%
Age	18 - 30	109	26.2%
	31 - 45	191	45.9%
	More than 45	116	27.9%
Educational Qualification	High School and below	122	29.3%
	Vocational Diploma	76	18.3%
	Undergraduate	181	43.5%
	Postgraduate	37	8.9%
Current Job Position	Company manager	168	40.4%
	Assistant manager	86	20.7%
	Head of department	83	20.0%
	Unit manager	79	19.0%
Current Service	1-3	103	24.8%
	4-7	110	26.4%
	More than 7	203	48.8%
Company Service	1-5	110	26.4%
	6-10	104	25.0%
	More than 10 years	202	48.6%

The above results demonstrate a comprehensive focus on all governorates within the region, with a significant percentage of responses collected from each area. However, it is observed that the Halabja governorate had a lower number of completed questionnaires due to the limited number of manufacturing companies that produce construction materials in that area. Additionally, it was noted that the majority of these companies were local or national, with only a small representation of international firms. This observation suggests a lack of investment by international companies in the production of construction materials within the region.

In terms of the respondents, a predominant majority were male, highlighting the disparity in opportunities for women and men to attain management positions within the companies studied. Many respondents held bachelor's degrees and occupied managerial roles, with a notable tenure in their respective companies and positions. This reflects a positive indicator, as it indicates the respondents' commitment to enhancing their knowledge alongside gaining practical experience.

4.3 Measurement Model Assessment

4.3.1 First -Order Model Assessment

This work assessed the first–order reflective measurement model using the disjoint two-stage technique [87] and the protocols established by [88, 89]. All primary latent constructs were evaluated based on outer loadings, internal consistency reliability, convergent validity, and discriminant validity.

1-Indicator Reliability (Outer Loadings):

The measurement of each construct was evaluated by analyzing the outer loadings of its indicators. Outer loadings denote the correlation between each observed variable (item) and its corresponding latent construct. Hair [88] assert that loadings of 0.70 or more are deemed excellent, whereas loadings beyond 0.60 are often acceptable if corroborated by robust reliability statistics for the whole construct. The results in Table 2 and Figure 2 indicate that nearly all indicators demonstrated loadings over 0.60, with several exceeding the more rigorous threshold of 0.70. For instance, the innovativeness components exhibited values between 0.66 and 0.765, risk-taking ranged from 0.637 to 0.703, and frequency of entrepreneurship varied from 0.606 to 0.707. This pattern indicates that each item significantly contributes to its intended construct, demonstrating sufficient indication of dependability.

2-Internal Consistency Reliability (Cronbach's Alpha and Composite Reliability):

Internal consistency reliability assesses the extent to which items within a construct uniformly measure the same latent variable. Cronbach's alpha is the predominant statistic for this purpose and is deemed acceptable when values surpass 0.70. In this model, all constructs exceeded this criterion, with scores ranging from 0.733 for proactiveness to 0.834 for response. Composite reliability (CR) was determined, providing a more robust measure by including the contribution of each item's loading to the overall construct. All constructs attained CR values beyond 0.70, ranging from 0.738 to 0.835, thus reinforcing the robust internal consistency of the constructs and signifying the reliability of the measuring tools.

3-Convergent Validity (AVE):

Convergent validity assesses the level of consensus among items that indicate a hidden construct. The average variance extraction (AVE) constitutes the main measure of convergent validity and must exceed 0.50 to be considered adequate [86, 90]. The results show that all components in this study exhibited AVE values considerably exceeding the threshold, ranging from 0.663 to 0.758. The high AVE values signify that each construct comprises a significant proportion of variance in its indicators, exhibiting adequate convergent validity.

These data collectively validate the reliability of the measurement scales utilized in the investigation. The robust outer loadings indicate that each item serves as a significant indicator of its respective construct. The continuously elevated Cronbach's alpha and composite reliability coefficients further validate the dependability of the scales. The AVE values for all constructs surpass the suggested minimum, confirming that the scales possess robust convergent validity. The results confirm that the measurement model accurately demonstrates the theoretical components and is suitable for subsequent structural analysis to yield valid and reliable conclusions.

Table 2. Item loadings, Cronbach's alpha, composite reliability, and AVE for the first-order constructs

Construct	Items	Outer Loading	Cronbach's Alpha	Composite Reliability	AVE
Innovativeness	Q1-El-In	0.681	0.792	0.795	0.758
	Q2-El-In	0.699			
	Q3-El-In	0.765			
	Q4-El-In	0.66			
Risk-taking	Q5-El-R	0.65	0.762	0.762	0.721
	Q6-El-R	0.703			
	Q7-El-R	0.673			
	Q8-El-R	0.637			
Proactiveness	Q9-El-P	0.654	0.733	0.738	0.706
	Q10-El-P	0.648			
	Q11-El-P	0.692			
	Q12-El-P	0.666			
Frequency of entrepreneurship	Q13-El-F	0.606	0.752	0.754	0.663
	Q14-El-F	0.662			
	Q15-El-F	0.707			
	Q16-El-F	0.655			
Organizational robustness	Q1-BR-OR	0.623	0.793	0.794	0.712
	Q2-BR-OR	0.573			
	Q3-BR-OR	0.652			
	Q4-BR-OR	0.626			
	Q5-BR-OR	0.672			
	Q6-BR-OR	0.605			
Readiness	Q7- BR-Rea	0.613	0.754	0.758	0.698
	Q8-BR- Rea	0.679			
	Q9-BR- Rea	0.684			
	Q10-BR-Rea	0.678			
Response	Q11-BR-Res	0.565	0.834	0.835	0.691
	Q12-BR-Res	0.636			
	Q13-BR-Res	0.66			
	Q14-BR-Res	0.626			
	Q15-BR-Res	0.655			
	Q16-BR-Res	0.608			
	Q17-BR-Res	0.586			
	Q18-BR-Res	0.629			
Recovery	Q19-BR-Rec	0.658	0.739	0.738	0.712
	Q20-BR-Rec	0.64			
	Q21-BR-Rec	0.643			
	Q22-BR-Rec	0.634			

4- Fornell-Larcker Discriminant Validity Assessment

Discriminant validity was assessed utilizing the Fornell-Larcker criterion, which contrasts the square root of the average variance extracted (AVE) for each evaluation with the correlations between that construct and all other constructs in the model. Table 3 illustrates that the bold diagonal elements denote the square roots of the Average Variance Extracted (AVE) for each construct, whereas the off-diagonal elements represent the correlations between constructs. The Fornell-Larcker criterion considers that discriminant validity is verified when the square root of the Average Variance Extracted (AVE) for a particular construct surpasses its maximum correlation with any other construct. All constructs in the current results satisfy this requirement. The square root of AVE for organizational robustness (0.626) surpasses its correlations with other constructs, and each construct's diagonal value exceeds all off-diagonal values in its respective row and column. This pattern affirms that each construct exhibits more dramatic variance with its respective indicators than with any other construct in the model. The results strongly indicate that discriminant validity is demonstrated, demonstrating that the latent constructs in the measurement model are empirically distinct (Fornell & Larcker, 1981).
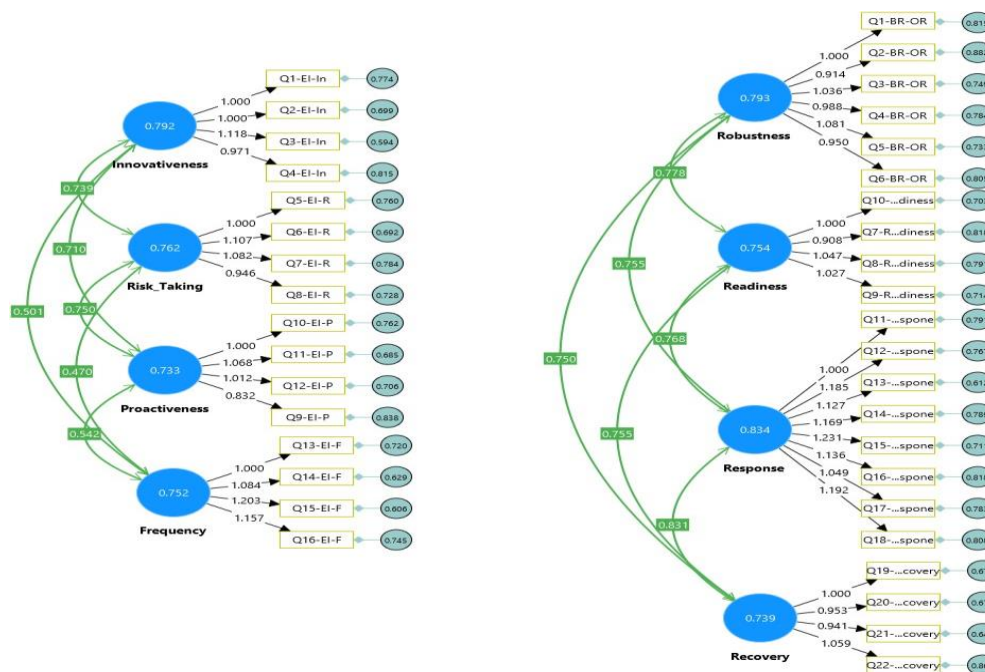
Figure 2. **First-Order Measurement Model (PLS-SEM Path Diagram) Showing Outer Loadings and Internal Consistency (Smart-PLS 4.1.0.9)**

Table 3. Fornell-Larcker criteria

	Frequency of entrepreneurship	Innovativeness	Proactiveness	Readiness	Recovery	Response	Risk-taking	Organizational robustness
Frequency of entrepreneurship	0.659							
Innovativeness	0.501	0.702						
Proactiveness	0.542	0.71	0.643					
Readiness				0.662				
Recovery				0.755	0.644			
Response				0.768	0.831	0.623		
Risk taking	0.47	0.739	0.75				0.666	
Organizational robustness				0.778	0.75	0.755		**0.626**

5-Heterotrait-Monotrait (HTMT) Ratio Assessment

To validate discriminant validity, the Heterotrait-Monotrait (HTMT) ratio of correlations was analyzed, as advised by Henseler, et al. [91],the HTMT ratio serves as a rigorous standard for evaluating discriminant validity, with values below 0.90 often signifying adequate differentiation between constructs. Table 4 indicates that all HTMT values in the present model are well below the 0.90 criterion, with the maximum recorded value at 0.835. This outcome indicates that none of the constructs in the measurement model displays problematic overlap, and all latent variables are empirically distinct from one another. Consequently, the HTMT results furnish compelling evidence that discriminant validity is confirmed among the constructs in this investigation. The findings, along with the Fornell-Larcker results, validate the suitability of the measurement model and endorse its application in following structural research.

Table 4: Heterotrait-Monotrait (HTMT) Ratio of Correlations Among Constructs

Heterotrait-Monotrait (HTMT) ratio	Frequency of entrepreneurship	Innovativeness	Proactiveness	Readiness	Recovery	Response	Risk Taking
Innovativeness	0.508						
Proactiveness	0.558	0.72					
Readiness	0.533	0.6	0.684				
Recovery	0.408	0.567	0.771	0.762			
Response	0.442	0.643	0.738	0.781	0.835		
Risk Taking	0.467	0.75	0.765	0.659	0.729	0.733	
Organizational robustness	0.605	0.707	0.791	0.793	0.752	0.76	0.734

4.3.2 SECOND-ORDER MODEL ASSESSMENT

Entrepreneurial intensity is defined as a second-order reflective construct consisting of three first-order dimensions: innovativeness, risk-taking, and proactiveness. Business Resilience was regarded as a higher-order construct composed of its corresponding aspects. The second-order measurement model was evaluated utilizing the Repeated Indicator Approach in Smart PLS, resulting in acceptable CR and AVE values.

4.4 STRUCTURAL MODEL ASSESSMENT

4.4.1 COLLINEARITY DIAGNOSTICS

Collinearity statistics were analyzed to determine the presence of multicollinearity among the predictor constructs in the structural model. Table 5 illustrates that the variance inflation factor (VIF) values for all variables, namely innovativeness, risk-taking, proactiveness, Frequency of entrepreneurship, organizational robustness, readiness, response, and recovery, varied from 1.276 to 2.241. The results are far lower than the established threshold of 5.0, as suggested by Hair, et al. [86] showing that multicollinearity is not a concern for this investigation. The lack of elevated VIF values indicates that the predictor constructs are adequately independent, hence improving the reliability and validity of the computed path coefficients in the structural model. Thus, the findings validate that all predictors satisfy the necessary collinearity requirements, reinforcing the integrity of the hypothesis testing and the comprehensive evaluation of the structural model.

Table 5. Collinearity Statistics (VIF Values)

Predictor Construct	VIF	Interpretation
DE-Innovativeness-EI	1.744	No multicollinearity
DE-Risk-taking -EI	1.768	No multicollinearity
DE-Proactiveness- EI	1.738	No multicollinearity
Frequency of entrepreneurship-EI	1.276	No multicollinearity
Organizational robustness- BR	1.96	No multicollinearity
Readiness-BR	1.947	No multicollinearity
Response-BR	2.241	No multicollinearity
Recovery -BR	1.993	No multicollinearity

4.4.2 OUTER LOADINGS TABLE FOR SECOND-ORDER MODEL

The outer loadings table for the second-order model delineates the associations between the first-order dimensions and their corresponding higher-order constructs. Table 6 illustrates that all dimensions contributing to business resilience, namely, organizational robustness, readiness, recovery, and response, exhibit substantial outer loading values, varying from 0.825 to 0.862. The values demonstrate a strong correlation between the first-order dimensions and the business resilience concept, hence affirming the validity of the second-order structure. The loadings for innovativeness, proactiveness, and risk-taking in entrepreneurial intensity (EI) are significantly high (all above 0.80), although the frequency of entrepreneurship is lower at 0.641, which remains acceptable. Hair [88] indicate that loadings beyond 0.7 are desired; however, values above 0.6 may be preserved if the overall construct dependability is robust. These results together affirm that the first-order dimensions are significant markers of their corresponding second-order constructs, hence strengthening the validity and resilience of the hierarchical model.

Table 6. **Outer Loadings for Second-Order Model**

	BR	EI
BR-OR	0.846	
BR-Readiness	0.825	
BR-Recovery	0.827	
BR-Response	0.862	
EI-F		0.641
EI-In		0.812
EI-P		0.833
EI-R		0.825

4.4.3 RELIABILITY AND CONVERGENT VALIDITY STATISTICS FOR SECOND-ORDER CONSTRUCTS (BUSINESS RESILIENCE AND ENTREPRENEURIAL INTENSITY)

Table 7 encapsulates the reliability and convergent validity metrics for the second-order constructs, business resilience (BR) and entrepreneurial intensity (EI). Both constructs demonstrate substantial internal consistency, evidenced by Cronbach's alpha values of 0.861 for BR and 0.785 for EI, surpassing the recommended threshold of 0.7 [86].The composite reliability values (both rho_a and rho_c) are strong for both constructs, with all coefficients exceeding 0.8, so affirming the stability and reliability of the scales. Additionally, the average variance extracted (AVE) values are 0.706 for business resilience and 0.611 for EI, both significantly exceeding the minimum threshold of 0.50, indicating robust convergent validity. The findings demonstrate that the second-order constructs are measured with reliability and that the items account for a significant percentage of variance in their respective constructs, hence validating the suitability of the higher-order measurement model for subsequent structural analysis.

Table 7. **Cronbach's Alpha, Composite Reliability, and AVE for Business Resilience and Entrepreneurial Intensity**

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
BR	0.861	0.865	0.906	0.706
EI	0.785	0.805	0.862	0.611

4.4.4 DISCRIMINANT VALIDITY ASSESSMENT USING CROSS LOADINGS FOR SECOND-ORDER CONSTRUCTS

Table 8 displays the cross-loadings of all first-order dimensions on the second-order constructs, business resilience (BR) and entrepreneurial intensity (EI). Discriminant validity criteria stipulate that each indication must have a higher loading on its corresponding construct than on any alternative construct. In this table, all business resilience dimensions (BR-OR, BR-Readiness, BR-Recovery, BR-Response) demonstrate greater loadings on business resilience (between 0.825 and 0.862) compared to entrepreneurial intensity (between 0.601 and 0.707). All dimensions of entrepreneurial intensity (EI-F, EI-In, EI-P, EI-R) exhibit their maximum loadings on entrepreneurial intensity (0.641 to 0.833), in contrast to their cross-loadings on business resilience (0.457 to 0.673). The results demonstrate adequate discriminant validity, as each dimension exhibits a stronger correlation with its corresponding second-order construct than with the alternative construct. The cross-loading matrix validates the empirical distinctiveness of business resilience and entrepreneurial intensity within the model.

Table 8. **Discriminant Validity Assessment Using Cross Loadings for Second-Order Constructs**

	BR	EI
BR-OR	0.846	0.707
BR-Readiness	0.825	0.601
BR-Recovery	0.827	0.606
BR-Response	0.862	0.661
EI-F	0.457	0.641
EI-In	0.593	0.812
EI-P	0.673	0.833
EI-R	0.656	0.825

Table 9 displays the Fornell-Larcker criterion values utilized for evaluating discriminant validity between the second-order components, business resilience (BR) and entrepreneurial intensity (EI). Based on this criterion, the square root of the average variance extracted (AVE) for each construct, indicated on the diagonal (in bold), must exceed its correlation with any other construct (off-diagonal values). The diagonal values for business resilience (0.84) and entrepreneurial intensity (0.782) in this table surpass their corresponding off-diagonal correlations (0.769). This demonstrates that each

concept exhibits greater variation with its respective indicators than with the other construct, hence affirming discriminant validity. Thus, the findings affirm the empirical distinctiveness of business resilience and entrepreneurial intensity inside the model, guaranteeing that the two constructs are sufficiently differentiated and assessed without considerable overlap.

Table 9: Fornell-Larcker Criterion

|	BR	EI
BR	0.84	
EI	0.769	0.782

4.5 HYPOTHESIS TESTING

The structural model was assessed utilizing the bootstrapping technique (with 5000 subsamples) to examine the proposed relationships; Table 10 displays the findings of the structural model evaluation concerning the hypothesized relationship between entrepreneurial intensity and business resilience. The path coefficient from entrepreneurial intensity to business resilience is 0.769, signifying a robust and affirmative influence. The standard deviation is 0.023, and the associated t-statistic is 32.947, significantly exceeding the crucial value for statistical significance. Additionally, the p-value is 0.0000, indicating that the effect is extremely significant at the 0.001 level. The results offer compelling evidence that increased entrepreneurial intensity markedly improves business resilience within the sample. The data robustly supports the premise that entrepreneurial intensity positively influences business resilience, underscoring the significance of entrepreneurial intensity in cultivating business resilience.

Table 10. Structural Model Path Coefficient, Standard Error, t-Statistic, and p-Value

Path	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	p-values
EI -> BR	0.769	0.77	0.023	32.947	0.000**

** Significant at level (p<0.01)

Figure 3 depicts the second-order structural model connecting business resilience to entrepreneurial intensity EI. Each construct is depicted as a blue latent variable alongside its corresponding first-order dimensions, which are illustrated in yellow boxes. The path coefficient from business resilience to entrepreneurial intensity is 0.769, signifying a robust, positive, and statistically significant influence. The figures on the arrows connecting the latent variables to their corresponding dimensions indicate outside loadings, all above 0.60, so affirming the trustworthiness of the measurement model. The R^2 value of 0.592 within the entrepreneurial intensity construct signifies that 59.2% of the variance in entrepreneurial intensity is elucidated by business resilience. This graphic illustrates the multifaceted nature of both categories and emphasizes the substantial influence of company resilience on entrepreneurial intensity within the sample.
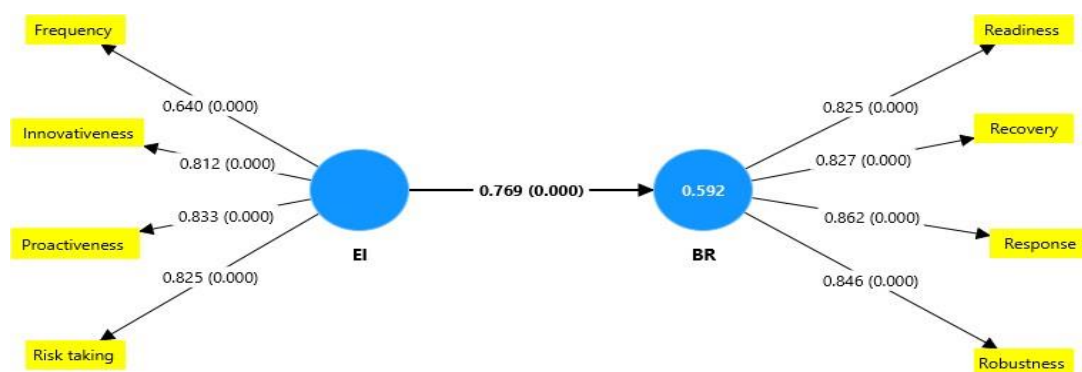
Figure 3. Detailed Structural Model of Business Resilience (BR) and Entrepreneurial Intensity (EI) (Smart PLS 4.1.0.9)

Table 11 presents the outer loadings, standard errors, t-statistics, and p-values for the first-order dimensions corresponding to their respective second-order constructs, Entrepreneurial Intensity (EI) and Business Resilience (BR). The outer loadings for all dimensions are substantial, varying from 0.64 (Frequency of entrepreneurship on EI) to 0.862 (Response on BR), signifying robust correlations between each dimension and its higher-order construct. Established norms indicate a preference for loadings over 0.70, while values above 0.60 may be deemed acceptable if substantiated by statistical significance.

The t-statistics for all loadings significantly surpass the crucial threshold of 1.96 (for p < 0.05), with values between 14.423 and 51.55. All p-values are 0.0000, indicating that the loadings are extremely statistically significant. This verifies

that each first-order dimension significantly and consistently contributes to the assessment of its corresponding second-order construct. These results collectively offer robust evidence for the construct validity and reliability of the hierarchical measurement approach, endorsing the application of these dimensions in evaluating entrepreneurial intensity and business resilience.

Table 11. Outer Loadings and Significance Tests for Second-Order Constructs

Path	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	p-value
Frequency of entrepreneurship <- EI	0.64	0.639	0.044	14.423	0.000**
Innovativeness <- EI	0.812	0.812	0.02	41.412	0.000**
Proactiveness <- EI	0.833	0.832	0.019	44.667	0.000**
Readiness <- BR	0.825	0.825	0.021	39.278	0.000**
Recovery <- BR	0.827	0.826	0.019	43.188	0.000**
Response <- BR	0.862	0.862	0.017	51.55	0.000**
Risk taking <- EI	0.825	0.826	0.019	44.041	0.000**
Organizational robustness <- BR	0.846	0.846	0.017	49.309	0.000**

** Significant at level (p<0.01)

4.6 MODEL PREDICTIVE ACCURACY AND RELEVANCE

Table 12 displays the cross-validated redundancy (Q^2) values for business resilience (BR) and entrepreneurial intensity (EI). The Q^2 value for business resilience is 0.411, significantly exceeding zero, which signifies that the structural model possesses considerable predictive validity for this construct. This indicates that the model can precisely forecast business resilience based on its predictors. Conversely, the Q^2 value for entrepreneurial intensity is zero, indicating that it is an exogenous variable within the model and is not influenced by other constructs. These results affirm that the model demonstrates enough predictive potential for the endogenous construct, BR, validating its appropriateness for subsequent study.

Table 12. Cross-Validated Redundancy (Q^2) Values for Predictive Relevance

	SSO	SSE	Q^2 (=1-SSE/SSO)
BR	1664	979.289	0.411
EI	1664	1664	0

The f-square value for the pathway from business resilience (BR) to entrepreneurial intensity (EI) is 1.45, as indicated in Table 13. Cohen's (1988) criteria indicate that f-square values of 0.02, 0.15, and 0.35 correspond to modest, medium, and high effect sizes, respectively. The derived value of 1.45 signifies a considerable effect size, illustrating that business resilience exerts a significant influence on entrepreneurial intensity inside the structural model. The substantial effect size further corroborates the significance and practical relevance of the link between business resilience and entrepreneurial intensity in the examined sample.

Table 13. Effect Size (f^2) for the Path from Business Resilience to Entrepreneurial Intensity

Path	f-square
BR -> EI	1.45

DISCUSSION

Building upon the analysis, the findings of this study offer robust evidence supporting the significant role of entrepreneurial intensity in enhancing business resilience among manufacturing companies producing construction materials in the Kurdistan Region of Iraq. The positive and statistically significant relationship between entrepreneurial intensity and business resilience suggests that corporations showing higher degrees of innovation, risk-taking, proactiveness, and entrepreneurial activity frequency are higher positioned to withstand disruptions, preserve continuity, and recover from adversities.

With the present study's outcomes, these final results align with present literature that emphasizes the important characteristic of entrepreneurial behaviors in fostering organizational adaptability and innovation ability [77, 83]. Specifically, companies with sturdy entrepreneurial intensity appear more capable of awaiting changes, proactively responding to environmental uncertainty, and adapting their strategies to maintain performance. This supports Duchek

[33] and Korber and McNaughton [69] conceptualizations of resilience as a dynamic capability promoted by way of proactive and revolutionary tendencies. The major contributions of the three sub-dimensions of entrepreneurial intensity —innovativeness, risk-taking, and proactiveness—further underscore the nuanced mechanisms through which entrepreneurial behavior influences resilience. Notably, among them, proactiveness and innovativeness confirmed particularly robust aspect loadings, suggesting that strategic foresight and creativity are pivotal in building organizational robustness, reaction functionality, and recovery efficiency. These findings are correlated with previous research highlighting the relevance of entrepreneurial orientation in crisis response and strategic renewal [19, 31]. In addition, the study introduces a multidimensional view of business resilience, incorporating robustness, readiness, reaction, and recovery. The significant outer loadings of these dimensions strengthen their collective significance in defining and operationalizing resilience. Notably, the excessive impact underscores the practical impact of entrepreneurial behavior on business continuity and long-term sustainability.

According to the results of this study, we can see that entrepreneurial intensity is also crucial to reflect on the contextual specificity of those findings. In a developing and post-conflict region such as the Kurdistan Region, institutional instability, regulatory volatility, and economic uncertainty make resilience a vital organizational priority. In this regard, firms that invest in entrepreneurial skills are not only more flexible but additionally strategically positioned to exploit rising opportunities, even in antagonistic environments. This aligns with previous studies that tie entrepreneurial intensity to enhanced company performance under situations of uncertainty [41, 79]. In addition, the strong contribution of the frequency of entrepreneurship is that the regular and steady enactment of entrepreneurial conduct plays a crucial position in sustaining resilience. This indicates that resilience is not always solely a made of high-effect entrepreneurial initiatives (degree), but also of the continuity and repetition over time. Therefore, cultivating a sustained entrepreneurial tradition is critical—one that prioritizes ongoing innovation and strategic responsiveness over ad hoc or reactive efforts.

Critically reflecting on the implications, the empirical validation of the theoretical strengthens contributions, methodologically and theoretically. It bridges a notable gap within the literature with the aid of integrating entrepreneurial intensity and business resilience into a comprehensive framework relevant to production sectors in rising markets.

CONCLUSIONS

This study has effectively performed its primary goal of exploring the role of entrepreneurial intensity in improving business resilience amongst manufacturing companies producing construction materials in the Kurdistan Region of Iraq. The study contributes meaningfully to both theoretical knowledge and sensible commercial enterprise utility, with their findings organized into theoretical and practical domains.

Theoretically, the study has conceptualized and operationalized entrepreneurial intensity by integrating its degree (innovativeness, risk-taking, and proactiveness) and frequency components. It provides empirical evidence on how these dimensions relate to business resilience, supplying a new framework for information on the entrepreneurial behavior-resilience link in volatile markets. Practically, it identifies which specific entrepreneurial intensity components have an impact on a firm's capability to hold operations and maintain competitiveness under uncertainty. These insights help regional producers adopt proactive techniques to face local and international market demanding situations more successfully. The study's contributions increase to academia by enriching the literature connecting entrepreneurial behavior to resilience, especially inside emerging and submit-conflict economies. It fills a gap via operationalizing entrepreneurial intensity comprehensively and linking it to a resilience framework, laying the basis for future empirical studies on firm-degree adaptability. For practitioners and enterprise leaders, the research emphasizes improving a tradition of innovation, strategic danger-taking, and steady entrepreneurial movement to deal with fluctuations in charges, rules, and supply chains. The integration of entrepreneurship into operations is shown to enhance organizational preparedness, robustness, and recuperation. Policymakers are encouraged to increase supportive measures like training, innovation incentives, and tailored financing for the world.

Manufacturing corporations within the Kurdistan Region should enhance entrepreneurial intensity to strengthen resilience. They should promote innovation, support proactive conduct, and encourage strategic risk-taking by empowering personnel and embedding entrepreneurship into ordinary practices. Strategic partnerships with institutions and authority bodies can similarly toughen resilience. Policymakers are urged to implement entrepreneurship-supportive applications, infrastructure, and economic tools, in particular designed for this sector. Despite its contributions, the study has limitations. It is geographically restrained to Kurdistan and focuses entirely on production substances producers, limiting the broader applicability of the findings. Its pass-sectional design prevents setting up causality or tracking changes through the years. Additionally, reliance on self-stated data raises concerns about capacity biases, which include social desirability or common approach variance.

Future research needs to propose addressing those limitations. Longitudinal research can display how entrepreneurial behavior modifications over the years and affects resilience more accurately. Replicating this research in distinct sectors or areas will test the model's generalizability. Investigating moderating variables—together with firm size, leadership style, or get admission to external support—may additionally make clear the entrepreneurial intensity and business resilience relationship. Qualitative research may want to uncover deeper insights into cultural and organizational

techniques. Lastly, applying the framework to different sectors like transportation, food production, or energy may moreover display unique, company-specific resilience strategies.

CONFLICTS OF INTEREST

The author declares no conflict of interest.

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