



ARTICLE



<https://doi.org/10.1057/s41599-025-04686-2>

OPEN

# The role of the institutional environment on Saudi female digital entrepreneurs' behavior

Abrar Alhajri <sup>1✉</sup> & Monira Essa Aloud <sup>2</sup>

The institutional context has gained significant attention in countries where institutional factors are related to entrepreneurs' individual-level behavior. This study, through the lens of institutional theory, aims to examine the impact of the three-dimensional country institutional profile—including, the regulative, cognitive, and normative dimensions—on the behavior of female digital entrepreneurs in Saudi Arabia, proposing that entrepreneurial behavior is influenced by the institutional environment. This study used a quantitative research design to collect data from 662 Saudi female digital entrepreneurs through a web-based, closed-ended, structured questionnaire. The results indicate that cognitive and normative institutional environments significantly impact entrepreneurial behavior; however, the regulatory institutional environment does not play a significant role in the behavior of female digital entrepreneurs in Saudi Arabia. The results suggest that developing supportive regulations and laws might not be sufficient to influence female entrepreneurs' behavior; normative and cognitive informal institutional environments might be critical factors in shaping this association.

<sup>1</sup>Business Administration Department, College of Business, Imam Mohammad Ibn Saud Islamic University (IMSIU), Riyadh, Saudi Arabia. <sup>2</sup>Management Information Systems Department, College of Business Administration, King Saud University, Riyadh, Saudi Arabia. ✉email: [afalhajri@imamu.edu.sa](mailto:afalhajri@imamu.edu.sa)

## Introduction

Digital technologies have attracted, and continue to attract, significant attention in popular media as a platform that offers space for entrepreneurship (Martinez-Dy et al. 2017) and is inclusive to all individuals (Paul et al. 2023). Research (e.g., Dana et al. 2024; Paul et al. 2023) positions digital technologies as an enabler for all entrepreneurs; however, an emerging research stream argues that digital technologies used by socially marginalized groups (e.g., women, minorities, and immigrants) are not always effective as levelers due to socio-cultural and institutional barriers (Alhajri and Aloud 2024). The study of gender differences has garnered attention, leading researchers to examine these differences in light of institutional determinants (Bui et al. 2018). This has sparked academic interest in studying the impact of digital technologies on female entrepreneurship (Alhajri and Aloud 2024).

As interest in female entrepreneurial ventures grows (Hashim 2023), research has explored various aspects, including how technology impacts female entrepreneurs' access to funding, their ability to work across industries, and the pressure to conform to gender expectations online (Martinez-Dy et al. 2018; McAdam et al. 2020). Despite these valuable contributions, there is a noticeable gap in the literature regarding the experiences of female digital entrepreneurs, particularly in Arab countries (Alhajri and Aloud 2024). This gap is significant considering the role that females' adoption of digital technologies plays in enhancing economic growth and reducing unemployment (International Labour Organization 2024). While existing research often focuses on societal barriers faced by female entrepreneurs in Arab countries (Hashim et al. 2024; Tlaiss et al. 2024), there is a need to recognize the contribution of females' digital entrepreneurship (DE) in driving economic progress, innovation, and employment (Ughetto et al. 2020). Moreover, despite calls to study individual behavior within a country using the theory of institutional economics (Aparicio et al. 2016; Sahasranamam and Nandakumar, 2020; Sobhan et al. 2024; Urbano et al. 2020), existing studies have primarily focused on entrepreneurial personalities and traits, neglecting the importance of understanding how various institutional aspects influence female entrepreneurial behavior (EB) in the challenging landscape of DE (Alhajri and Aloud 2024). Therefore, it is crucial to examine the institutional context of entrepreneurship from both national and global perspectives (Alhajri and Aloud 2024), as the country's institutional entrepreneurship framework has been found to influence human behavior (Sussan and Acs 2017).

It is suggested that institutional factors (i.e., formal and informal) and the national conditions that shape those factors may eventually determine the rate and type of entrepreneurial activities (Urbano et al. 2020). Baumol (1990), North (1994), and Scott (2014), agreed that institutions present society's ground rules, where stability and better performance are the main characteristics. North (1991, p. 97) defined institutions as constraints that regulate and monitor social, political, and economic interactions, classifying constraints into informal, such as taboos, sanctions, customs, traditions, and codes of conduct, and formal, such as laws, constitutions, and property rights. The country institutional profile (CIP) represents the wide range of institutions influencing entrepreneurship at the country level. According to Kostova (1997, p. 180), CIP indicates "the group of all related and established institutions over time that operate within the same country and get transmitted into organizations through people." The notion of CIP was first introduced by Kostova (1997) to elucidate how the country-level environment affects individuals, organizations, and routines.

A review of the literature on DE indicates that CIP has not been empirically examined. Few studies have explored the link

between institutional dimensions and entrepreneurship in general (Urbano and Alvarez 2014; Veciana and Urbano 2008), or DE, in particular (Ngoasong 2018). Several definitions of DE are available in the literature (Kraus et al. 2019). Hull et al. (2007) defined DE as "...a subset of entrepreneurship study that ensures some or all of the physical activities in a traditional organization should be digitized." Another widely referenced definition formulated by Sussan and Acs (2017) described DE as "... any engaged agent in any venture type, either commercial, government, social, or corporate that applies digital technologies" (p. 66). The two definitions have several points in common. However, Sussan and Acs (2017) broadened the domain's scope to include all types of ventures (e.g., governmental, commercial, or social), while Hull et al. (2007) emphasized that digitalization could be present in all or some of a business's operations.

This study sheds light on the understudied context of Saudi Arabia, where a gender gap in established business ownership rates is evident (Kelly et al. 2022). The Saudi government has introduced several initiatives to encourage Saudi women to start their own businesses (GEM 2023) and utilize and integrate information and communication technology (ICT) in them (Roomi et al. 2022). However, despite these initiatives and national advancements in ICT and digital infrastructure, the female-owned businesses rate in Saudi Arabia is 4% compared to 7% for men, as per the latest Global Entrepreneurship Monitor (GEM) report (Kelly et al. 2022). While the low female representation in DE can be attributed to several factors, including institutional constraints and socio-cultural values to which Saudi women must adhere, researchers highlight the influence of institutional setting and call for more research to explore how women behave within such a structure in the Saudi context (Alhajri and Aloud 2024). The current study complements previous efforts and extends its focus on prior research by examining the impact of the regulatory, cognitive, and normative dimensions on the behavior of female digital entrepreneurs to answer the following research question.

To what extent does the regulatory institutional environment (RIE), including governmental support, laws, and regulations; the cognitive institutional environment (CIE), encompassing shared knowledge about business startups; and the normative institutional environment (NIE), comprising societal values and norms regarding entrepreneurship, affect the EB of Saudi female digital entrepreneurs?

Motivated by the inadequate attention that scholars have paid to the link between the institutional environment (IE) and the EB of female digital entrepreneurs, this study aims to examine the impact of the regulative, cognitive, and normative dimensions on the behavior of female digital entrepreneurs in Saudi Arabia. The study explores the IE's and DE's role in influencing Saudi females' EB using the institutional theory lens, contributing to research by including gender-related aspects with several implications. It presents a framework that employs the institutional theory and offers more insight into the institutional factors affecting female digital entrepreneurs. Specifically, it provides empirical evidence on the role of IE, including formal and informal institutions, as an essential component of the entrepreneurial ecosystem in DE. Finally, the study provides empirical evidence for governments and lawmakers on the impact of institutional dimensions on female digital entrepreneurial pursuits. The study is organized as follows. Part 2 provides background information on the institutional context, EB, and DE, and Part 3 describes the methods applied to test research hypotheses. Next, Part 4 presents the research results and answers the research question. Part 5 compares the results with previously published research, and Part 6 concludes by summarizing the study findings and research

implications, highlighting the research limitations, and further research directions.

## Background and related work

### Institutional environment and entrepreneurial behavior.

Institutional theory suggests that the formal and informal institutional dimensions can shape the behavior of organizations and individuals (Scott 2014). Moreover, institutions are positioned as multidimensional, socially founded structures with formal and informal rules, norms, and cultural beliefs and traditions as fundamental elements that encourage socially acceptable behaviors and attitudes (Scott 2001). Institutions are argued to function as “systems of meaning” that interpret the context in which individuals and organizations operate, interact, and gain legitimacy (Campbell 2020). This expands on the classical work of DiMaggio and Powell (2004) and is in line with neo-institutional theory, which assumes that entrepreneurial activities are not only shaped by individual and organizational forces but also by social and institutional ones (Suddaby et al. 2013; Tracey 2012).

Scott (2014) has distinguished the three dimensions of the IE into (1) regulative, (2) cognitive, and (3) normative. The regulatory dimension includes government policies, laws, and regulations about business startups and resource acquisitions (Busenitz et al. 2000). This dimension entails that entrepreneurial ventures can benefit from and use resources provided through government-sponsored initiatives and policies to facilitate and support businesses (Baughn and Neupert 2003; Busenitz et al. 2000). The cognitive dimension reflects people’s common social knowledge and skills regarding starting a business in a country. Therefore, cognitive structures in a given society shape the common frames and schemes used in selecting, processing and interpreting information (Kostova 1997). The normative dimension, emphasizes “non-codified attitudes” and acceptable or non-acceptable behaviors within societies. Norms, therefore, define how things should be performed and attach meanings and values to them. Normative institutions pertain to how favorable entrepreneurship is for society and whether entrepreneurs are admired individuals (Busenitz et al. 2000).

Studies have discovered that EB is preceded by “intentions” that can be formulated at a young age and during college years (Al-Mamary et al. 2020; Farashah 2015; Kolvereid and Isaksen 2006; Nowiński et al. 2020). This is in response to initiatives from governments and policymakers to promote entrepreneurship within the young population (Acs et al. 2016; Lerner 2021; Nowiński et al. 2020). However, as far as can be ascertained, no research has been conducted on female digital entrepreneurs’ motivations to pursue such a career path in Saudi Arabia. There is still a need for more specific research on gender-based entrepreneurship (Meyer 2018).

Furthermore, despite the availability of well-developed measures for the CIP (Busenitz et al. 2000; Kostova 1997), it has rarely been empirically tested within the context of female DE in the Middle East, particularly in the Saudi context, where qualitative studies dominate (McAdam et al. 2019, 2020). Much research exists on CIP from national experts using the National Expert Survey-Global Entrepreneurship Monitor (Arabiyat et al. 2019; Pinho and Thompson 2017). Pinho and Thompson (2017) compared developing and developed countries (Angola and Portugal) using data from national entrepreneurship experts. Another comparative study on university students in Spain and Portugal examined the IE’s influence on students’ entrepreneurial intentions (Díaz-Casero et al. 2012). Other studies focused on a cross-national level in emerging countries (Gupta et al. 2014; Manolova et al. 2008; Urban, 2013b). Thus, few researchers have considered entrepreneurs’ views regarding how favorable the

overall IE for entrepreneurship is and whether such institutional factors drive their EB. Additionally, a limited number of studies have examined the impact of institutional factors on females’ behavior (i.e., becoming an entrepreneur). This is particularly evident in emerging economies that have not yet been thoroughly studied regarding the impact of IE on entrepreneurship in general (McAdam et al. 2019) and specifically on female entrepreneurship (Gupta et al. 2014).

**Digital entrepreneurship.** The impact of DE on growth has become increasingly significant (Beliava et al. 2020; Kraus et al. 2019). The conditions and determinants to facilitate DE have attracted increasing attention from researchers and policymakers (Sahut et al. 2021). The previous studies suggest that most research in DE follows a trend that is focused on e-innovation, digital entrepreneurial ecosystems, digital platforms (Berger et al. 2021), digital business models, and digital organizations with related groups (e.g., founders, customers and shareholders) (Kraus et al. 2019).

As the field of DE is still emerging, many researchers have attempted to classify streams of research to shed light on areas to be addressed in the future. According to Berger et al. (2021), DE publications have gradually increased over the last decade. Kraus et al. (2019) outlined six main DE research streams: DE process, digital ecosystem, digital business models, platform strategies, social DE, and entrepreneurship education. Sahut et al. (2021) and Kraus et al. (2019) similarly identified four main research streams in DE: digital business models, DE in digital platforms, the DE process and the creation of new digital enterprises, and entrepreneurial digital ecosystems. Both studies have four research streams in common: digital ecosystems, digital platforms, digital business models and the DE process; however, Kraus et al. (2019) added social DE and entrepreneurship education. The systematic reviews revealed that several studies examined entrepreneurship education and the potential of using digital technologies in social entrepreneurship systems to overcome the digital divide gap for disadvantaged and poor populations. Kraus et al. (2019) also asserted that the influence of “cultural differences” should be considered when exploring DE adoption. Additionally, Satalkina and Steiner (2020) revealed three major research streams: entrepreneurs, entrepreneurial processes, and digital ecosystem. These categories include sub-nodes. For instance, dimension one, entrepreneur, covers areas such as the social impact of the entrepreneur, digital behavior patterns, and knowledge. Dimension two, the entrepreneurial process, contains articles that discuss digital business models, innovation orientation, digital determinants, value, startups, and marketing. The last dimension relates to the ecosystem, covering elements facilitating DE, social networks, and processes within the digital ecosystem. Avenues for future research were suggested in the reviews, including entrepreneurs’ behavioral patterns, DE intentions, and several untapped areas worth investigating, including the impact of DE on specific social issues (e.g., female underrepresentation in different sectors and matters regarding social position).

The term DE has been recently popular in Saudi Arabia (Alhajri and Aloud 2024; McAdam et al. 2019, 2020). With limited studies focusing on female entrepreneurs (McAdam et al. 2019, 2020), McAdam et al. (2020) evaluated female digital entrepreneurs’ development in the presence of many cultural and social “institutional voids”. They discovered that while gender boundaries existed, working online assisted female entrepreneurs in overcoming these hurdles. With gender segregation and the absence of “formal market-based institutions,” even networking was challenging for female entrepreneurs. McAdam et al. (2020)

concluded that although females in Saudi Arabia were marginalized, digital technologies could aid their growth as entrepreneurs. DE is characterized by low entry barriers compared to traditional entrepreneurship; therefore, it represents an excellent opportunity for female entrepreneurs, who encounter numerous financial and social hindrances, to be involved in entrepreneurial activities (McAdam et al. 2019). Utilizing digital technologies through the means of DE can provide marginalized groups (e.g., females) who constantly face financial and social constraints with an opportunity to engage in entrepreneurial activities due to its low entry barriers and resilience (Althalathini and Tlaiss 2023; McAdam et al. 2019, 2020).

**Female entrepreneurship in Saudi Arabia and potential for digital entrepreneurship.** The mainstream research on female entrepreneurship has mainly focused on the motivations for entrepreneurship (McGowan et al. 2012) or on the challenges faced by female entrepreneurs (Mathew 2010; Morris et al. 2006). Studies suggest that research on Saudi female entrepreneurship has involved female entrepreneurs in small and medium enterprises (SMEs; Danish and Smith 2012; Khizindar and Darley 2017; Sabri and Thomas 2019); or on female social entrepreneurship (Nieva 2015, 2016). According to one group of studies, Saudi female entrepreneurs were motivated by their need for achievement, self-esteem, and autonomy (Ahmad, 2011; Redien-Collot et al. 2017), and the desire for self-fulfillment (Sadi and Al-Ghazali 2012). Another motive for pursuing self-employment was balancing family responsibility and professional aspirations (Ahmad 2011; Danish and Smith 2012).

Additionally, another group of studies highlighted that female entrepreneurs faced many barriers (Ahmad 2011; Al-Kwafi et al. 2020; Basaffar et al. 2018; Danish and Smith 2012). These barriers can be classified into the following: culturally related, gender-specific, and those created by bureaucracy and lack of funding (Danish and Smith 2012). Culturally related challenges inhibit females' opportunities to pursue an entrepreneurial career. Ahmad (2011) reveals that conservative cultural norms could potentially limit females' aspiration to entrepreneurship and business growth. Cultural norms related to a gender-segregated society were found to restrict opportunities available to females (Ahmad 2011; Danish and Smith 2012). The gender-specific challenges are rooted in the bias against females, work-family conflict, and lack of essential managerial skills and training due to inadequate institutions dedicated to providing customized training programs for females (Basaffar et al. 2018; Welsh et al. 2014).

Women's lower interest in economic activities can be attributed to the absence of clear policies and procedures, cultural and social constraints imposed on women who work, the prevailing patriarchal mindset toward working women within the society, and family obligations (Alkhaled and Berglund 2018; Danish and Smith 2012; Elamin and Omair 2010). Danish and Smith (2012) concurred that female entrepreneurs face issues related to bureaucratic procedures, difficulty in accessing capital, and networking (Welsh et al. 2014). Such hurdles discourage females from entrepreneurship. Governmental support, training and knowledge, and social and financial support could reduce the perceived existing challenges impeding start-ups by female university students (Al-Kwafi et al. 2020). This corroborates the significance of financial and social support, training programs, and reduced administrative red tape (Aljarodi et al. 2023; Alomar 2023), attributing the higher rate of female TEA in Saudi Arabia, when compared to the UAE, to the governmental efforts in establishing business centers for females (Jabeen et al. 2015).

Saudi Arabia has made significant efforts to create opportunities for females in the labor market, which are to be enhanced

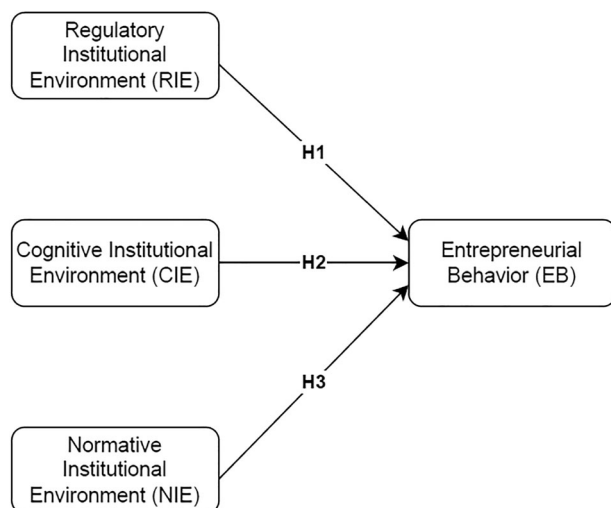
through several entrepreneurship programs and professional advancement courses (Almunajjed 2010). Although the country witnessed advancement in technology and digital infrastructure (MCIT 2020) along with several governmental initiatives supporting female entrepreneurship, little research has been dedicated to studying the impact of governmental support in motivating females to be entrepreneurs. Additionally, since DE is a new category of entrepreneurship, there exists the need to understand what motivates females to venture into entrepreneurship and whether technology can assist them in overcoming pre-existing institutional, social, and cultural challenges (McAdam et al. 2020). The lack of empirical studies on DE limits our understanding of digital entrepreneurs and their entrepreneurial activities, so it is critical to direct efforts in this new direction (Kraus et al. 2019).

**Model and research hypotheses.** This study aims to examine the influence of the CIP, including the regulatory, cognitive, and normative dimensions of the IE, on the behavior of female digital entrepreneurs. Therefore, the institutional theory (North, 1991) is used as a theoretical framework to investigate both formal and informal institutions' influences manifested through the CIP on female digital entrepreneurs in Saudi Arabia. The CIP is utilized to evaluate whether the regulatory, cognitive and normative institutional dimensions support DE activities. Building on Scott's (1995) research, Kostova (1997) developed the notion of the three-dimensional CIP to describe how the formal IE (regulatory dimension) and the informal IE (cognitive and normative dimensions) can affect and promote the success of local business activities (Scott 2014).

Extensive research has centered on the effect of IE on individual entrepreneur's actions (Sussan and Acs 2017) in developing nations (Gupta et al. 2014; Torkkeli et al. 2019). Entrepreneurial activities are positively influenced by favorable regulative, normative, and cognitive institutional dimensions (Urbano and Alvarez 2014). Hence, institutions can significantly influence venture creation decisions (Lim et al. 2010), as well as the rate and type of entrepreneurial activity (Stenholm et al. 2013). In the Saudi context, Aljarodi et al. (2023) and Alshebami and Seraj (2022) investigated how institutions affected the entrepreneurial activities of Saudi entrepreneurs of both genders and observed a strong association. Similarly, studies have attempted to comprehend social entrepreneurship from an institutional perspective and discovered a positive association between the institutional framework and social entrepreneurship (Urban 2013a, 2013b; Urban and Kujinga 2017; Urbano et al. 2010). Consequently, a suitable and attractive IE should exist for entrepreneurs to flourish.

In addition, IE's influence on female entrepreneurs has attracted research attention, given the well-established differences between the genders. This emphasizes the importance of incorporating the three dimensions of IE (regulatory, cognitive, and normative) to help female entrepreneurs realize and reach their full potential (Bui et al. 2018). Aljarodi et al. (2022) confirmed the significant impact of institutions on Saudi females' decisions to pursue entrepreneurship. Similarly, Yousafzai et al. (2015) investigated the relationship between the three pillars of IE and women's entrepreneurial leadership in 92 countries and discovered a positive correlation between regulatory institutions and the leadership of female entrepreneurs. Moreover, Welter et al. (2014) concluded that multiple levels of spatial-institutional context influence the EB of women. In other words, regulative institutions (laws, policies, and regulations) intersect with the spatial context (i.e., space and place), influencing (encouraging or discouraging) women's decisions to launch their ventures and





**Fig. 1 Theoretical framework.** The figure illustrates the influence of (regulatory, cognitive, and normative) institutional environments on entrepreneurial behavior.

determining the nature of such ventures (Welter et al. 2014). The institutional factors' impact on entrepreneurship is established in the previous studies (Aljarodi et al. 2022, 2023; Alshebami and Seraj 2022; Gupta et al. 2014; Sussan and Acs 2017); however, studies investigating the impact of institutional factors on overall DE and specifically on female DE remain limited. Therefore, this research aims to examine the influence of the regulatory, cognitive, and normative IEs on the behavior of female digital entrepreneurs; it aims to bridge the gap in the literature on female DE by providing empirical results on the impact of institutional factors on the EB of female digital entrepreneurs. The existing literature suggests that it is promising to use the institutional theory (North 1991) as a theoretical framework to study the potential influence of the regulatory, cognitive and normative IEs on female digital entrepreneurs by integrating their perception of the IE into an EB model (Alhajri and Aloud 2024).

Figure 1 depicts three dimensions of the (latent) construct (CIP) to examine its influence on female digital entrepreneurs' EB: regulatory institutional environment (RIE), cognitive institutional environment (CIE), and normative institutional environment (NIE). Entrepreneurial behavior (EB) is also a latent construct. The three research hypotheses examined in the current study are as follows:

H1: The RIE is positively related to the EB of female digital entrepreneurs.

H2: The CIE is positively related to the EB of female digital entrepreneurs.

H3: The NIE is positively related to the EB of female digital entrepreneurs.

## Methods

**Population and sampling.** This study focuses on digital entrepreneurs, including females who sell digital products, provide digital services, or indulge in digital marketing/selling/distribution. The entire population of female digital entrepreneurs in all regions of Saudi Arabia was targeted in this study. Several obstacles were associated with the sampling technique, including a lack of an exhaustive list of population members, namely Saudi female digital entrepreneurs. Moreover, the difficulty in identifying female digital entrepreneurs further complicated the sampling procedure. The difficulty arose from the fact that many female entrepreneurs in Saudi Arabia have informal businesses

with large customer bases without having a "commercial registration."

The GEM project emphasizes the significance of surveying entrepreneurs to gain information regarding informal economic activities that are neither in compliance with local regulations nor legally protected (GEM 2020; GEM 2019). These informal activities result in the figures of the SME census released by the General Authority for Statistics, being much lower than the actual numbers (Kelly et al. 2022). Since this study's target population was female digital entrepreneurs in Saudi Arabia, a sample frame was unavailable. Therefore, a non-probability sampling method, the purposive technique, was employed. Obtaining lists of officially registered entrepreneurs was not permitted due to confidentiality matters; thus, we collaborated with Monsha'at—the Small and Medium Enterprises General Authority in Saudi Arabia—to distribute the questionnaire to the female entrepreneurs listed in their databases. Furthermore, the questionnaire was also distributed by Riyadhah and Endeavor Saudi Arabia. Riyadhah is a non-profit national organization that offers financial and non-financial support to SMEs, and Endeavor Saudi Arabia is an organization that supports and invests in promising enterprises.

**Data collection.** A quantitative cross-sectional study design was used to test the proposed model (see Fig. 1). Data were collected through a web-based, closed-ended, structured questionnaire in Arabic and English. The items were initially created in English, but since the participants' native language is Arabic, two expert translators worked on translating the questionnaire into Arabic in a process called "forward translation." The questionnaire was then translated back into English, a process known as "backward translation."

The questionnaire comprised two sections; the first included questions regarding entrepreneurs' general demographics, while the second included 19 questions about their behavior and the IE of entrepreneurship in Saudi Arabia. The participants were contacted in person and via email. The electronic questionnaire link was sent by email and through their business accounts on social media platforms. The questionnaire distribution started in January and ended in June 2022; 1350 female entrepreneurs were contacted. After three reminders, a total of 662 completed questionnaires were received.

**Measurement scales.** This study used established self-report measures (Spector 1993) developed and validated in the entrepreneurship context to measure the constructs; however, to overcome issues attributed to this type of measure (e.g., common method variance [CMV]), certain steps were taken during questionnaire preparation and analysis, discussed in Section 3.4.2 (Podsakoff et al. 2003). This section illustrates the study's variables and describes the measurement item scales. Table 1 presents the used measures, Cronbach's alpha and the item-to-total correlation. The values of the item-to-total correlation are within the acceptable range of 0.30–0.70, as suggested by de Vaus (2013).

*The independent variables: RIE, CIE, NIE.* Following a recent research (Zhao et al. 2023), this study uses a 13-item scale developed by Busenitz et al. (2000) to measure the institutional dimensions of the country using the CIP scale, including three institutional dimensions (RIE, CIE, and NIE). The Cronbach's alpha coefficients for RIE, CIE, and NIE are 0.88, 0.88, and 0.84, respectively.

*The dependent variable: EB.* A six-item scale adapted by Gieure et al. (2020) is used to determine certain beliefs that impact the entrepreneurs' attitudes toward EB. The Cronbach's alpha coefficient for EB is 0.80.

Table 1 Measures, Items, Cronbach's Alpha and Item-to-Total Correlations.			
Construct/Items	Source (s)	Cronbach's Alpha	Item-to-total-correlations
<b>Country Institutional Profile (CIP)</b>	Busenitz et al. (2000)	0.88	
<b>Regulatory Institutional Environment (RIE)</b>			
1. In Saudi Arabia, government agencies assist those beginning their own business.			RIE1: 0.82
2. The Saudi government reserves some government contracts for new and small firms.			RIE2: 0.84
3. Local and national institutions provide special support to people who seek to launch a new business.			RIE3: 0.81
4. The Saudi government sponsors organizations that help new businesses develop.	0.88		RIE4: 0.88
5. The government helps business owners restart even a previous venture fails.			RIE5: 0.79
<b>Cognitive Institutional Environment (CIE)</b>			
6. People are aware of how to legally protect a new business.			CIE1: 0.86
7. Those who start new businesses know how to deal with much risk.			CIE2: 0.91
8. Those who start new businesses know how to manage risk.	0.84		CIE3: 0.89
9. Most people know how to obtain market for their products.			CIE4: 0.79
<b>Normative Institutional Environment (NIE)</b>			
10. In Saudi Arabia, turning new ideas into businesses is an admired career path.			NIE1: 0.79
11. In Saudi Arabia, innovative and creative thinking is considered as the route to success.			NIE2: 0.88
12. Entrepreneurs are admired in Saudi Arabia.	(Gieure et al. 2020)	0.80	NIE3: 0.84
13. People in Saudi Arabia tend to greatly admire those who start their own business.			NIE4: 0.80
<b>Entrepreneurial behavior (EB)</b>			
1. I have experience in starting new projects or businesses.			EB1: 0.76
2. I was capable of developing a business plan.			EB2: 0.76
3. I knew how to start a new business.			EB3: 0.84
4. I knew how to do market research.			EB4: 0.82

Because of these variables’ potential influence on the relationship between the IE and the EB, this study included several control variables, such as education, age, years of running the business and the number of employees. According to the literature, education significantly impacts people’s decisions to pursue an entrepreneurial career path (Hattab 2014; Lu and Tao 2010). Additionally, previous work confirms the association between education levels and entrepreneurial success and commitment (Dickson et al. 2008). Age also directly influences the propensity to become an entrepreneur (Lu and Tao 2010). Empirical evidence indicates that the likelihood of becoming an entrepreneur varies with age (Özdemir and Karadeniz 2011) and strongly predicts students’ entrepreneurial intentions (Sansone et al. 2021). Studies on entrepreneurship also controlled for the possible effect of the business life cycle (i.e., years of running the business) and number of employees (Bruderl et al. 1992), which might strongly influence entrepreneurial success and commitment (Acs and Armington 2004).

**Statistical analysis.** This study examines the impact of the IE on the EB of female digital entrepreneurs using latent constructs. Therefore, structural equation modeling (SEM) was employed using the Analysis of Moment Structures (AMOS version 26) and the maximum likelihood estimation method. SEM is a technique that combines confirmatory factor analysis (CFA) and linear regression (Kline 2016). CFA was used to test the validity of the measurement model for the latent constructs. Linear regression tests the structural model and examines the relationship between the correlations and the constructs (Kline 2016).

**CFA and scales’ reliability.** Before evaluating structural models in SEM according to the developed hypotheses, CFA is conducted to assess the relationship between constructs and their indicators, where CFA is considered the SEM’s measurement part (Hair et al. 2014). The suitability of factor analysis was assessed by several

assumptions before analysis, based on the guidelines by Hair et al. (2014), to ensure that the factor analysis was appropriate. The Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy indicated that the relationship strength among factors was high (KMO = 0.884), which is greater than 0.60 (Tabachnick et al. 2019), and hence, adequate to implement the analysis. It was statistically significant for Bartlett’s test of sphericity, which evaluates the significance of each correlation in the correlation matrix as a whole ( $\chi^2$  (171) = 6220,  $p < 0.001$ ); accordingly, it is suitable to conduct factor analysis.

**Common method variance.** CMV (i.e., common method bias) is a substantial challenge when variance attributes to the measurement method instead of the constructs presented by the measures (Podsakoff et al. 2003). Methodological biases cause significant issues since they represent a common major measurement error source (Podsakoff et al. 2003). This study collected data for both the independent (i.e., predictor variables) and dependent variables (criterion variables) from the same participants (female digital entrepreneurs). This can cause “artifactual covariance” between the independent and dependent variables (Podsakoff et al. 2003), requiring both procedural and statistical remedies.

Harman single-factor test, is among the popular post-hoc methods to detect CMV (Podsakoff et al. 2003). Following the greater-than-one eigenvalue extraction criterion, four factors were revealed, where the first factor explained 34% of the variance; thus, CMV is not a concern as the variance is less than 50% for all the factors.

Results

**Descriptive statistics.** Table 2 sums up the characteristics of the 662 participants, such as age and education, and the characteristics of the businesses, including the years the entrepreneur has

operated the business and the number of employees. Almost 60% were young entrepreneurs aged between 18 and 29; the remaining were 30 or older. Regarding entrepreneurs' education level, approximately two-thirds held bachelor's degrees, and less than a quarter were high school and diploma certificate holders. The table indicates that 70% of the businesses were relatively new, operating for less than three years. Furthermore, less than a quarter of the businesses were between three and six years old, and the remaining were operating for more than seven years. The number of employees ranged between 1 and 20, and the majority of the businesses—78%—had one person (the owner herself) engaged in the business. In comparison, almost 21% of the businesses had two to five employees.

**Confirmatory factor analysis.** Each item loaded on the predicted factor, and all item loadings produced significant t-values, except

**Table 2 Characteristics of the participants.**

Sample characteristics	n	% of sample
Age		
18-29	383	57.85
30-39	212	32.02
40-49	48	7.25
50-59	17	2.53
> 60 years	2	0.30
Education		
High school	96	14.50
Diploma	31	4.68
Bachelor's degree	493	74.47
Master's degree	37	5.59
Doctorate degree	5	0.76
Years of Running the Business		
Less than 3 years	461	69.64
3-6 years	158	23.87
7-10 years	32	4.83
11-14 years	9	1.36
More than 15 years	2	0.30
Number of Employees		
1 person	514	77.64
2-5	137	20.69
6-10	6	0.91
11-15	2	0.30
16-20	3	0.45

for two EB items, which were removed from further analysis. The CFA results showed measurement model was a good fit for the study scales. The model exhibited a good fit with  $\chi^2 = 441$ ,  $p < 0.001$ ,  $df = 113$ ,  $RMSEA = 0.06$ ,  $SRMR = 0.05$ ,  $CFI = 0.95$ ,  $TLI = 0.93$ , and  $IFI = 0.95$  (Hu and Bentler 1999). Table 3 presents the results of the CFA. To assess convergent validity, the average variance extracted (AVE) criterion suggested by Fornell and Larcker (1981) was used. The AVE values were all greater than the recommended value of 0.50, and the composite reliability (CR) of all constructs was higher than 0.6; hence, the convergent validity of the constructs is satisfied. Furthermore, discriminant validity was assessed following the criterion by Fornell and Larcker (1981). The square root of AVE for each construct was larger than its correlations (see Table 4). Therefore, reliability, discriminant validity, and convergent validity were established.

Table 4 presents the descriptive statistics and correlation coefficients for all variables. The following fit indices were used to assess the model fit: chi-square goodness of fit test, incremental fit indices (IFI), Tucker-Lewis index (TLI), comparative fit index (CFI), and root mean square error of approximation (RMSEA). The structural model was examined and exhibited a good fit ( $\chi^2 = 356.659$ ,  $p < 0.001$ ,  $df = 112$ ,  $IFI = 0.959$ ,  $TLI = 0.950$ ,  $CFI = 0.958$  and  $RMSEA = 0.057$ ); all indices were within the cutoff criteria and showed a good fit (e.g.,  $TLI \geq 0.95$ ,  $CFI \geq 0.95$  and  $RMSEA \leq 0.06$ ) (Dimitrov 2012; Hu and Bentler 1999).

**Structural modeling and hypotheses testing.** Table 5 lists the standardized direct effects of the EB of Saudi female digital entrepreneurs; the RIE dimension and EB relationship are insignificant ( $\beta = 0.090$ ,  $p = 0.095$ ). Accordingly, Hypothesis 1 is not supported. Despite this, previous studies reported a positive

**Table 4 Mean, standard deviation, AVE and correlation of constructs.**

	Mean	SD	AVE	CIP_R	CIP_C	CIP_N	EB
RIE	3.56	0.70	0.610	0.781			
CIE	3.28	0.81	0.668	0.466***	0.817		
NIE	4.06	0.67	0.583	0.578***	0.423***	0.764	
EB	3.49	0.80	0.516	0.273***	0.261***	0.309***	0.718

Diagonal elements represent the square root of AVE, \*\*\* $p < 0.001$

**Table 3 Confirmatory factor analysis results and construct validity.**

Construct	Item	Unstandardized coefficient Estimate	SE	Stand. Estimate	AVE	CR
RIE	RIE1	0.693	0.0321	0.744	0.61	0.89
	RIE2	0.672	0.0285	0.791		
	RIE 3	0.625	0.0285	0.753		
	RIE 4	0.729	0.0265	0.875		
	RIE5	0.604	0.0286	0.733		
CIE	CIE1	0.769	0.0321	0.797	0.67	0.89
	CIE2	0.863	0.0294	0.908		
	CIE3	0.798	0.0294	0.865		
	CIE4	0.629	0.0328	0.682		
NIE	NIE1	0.600	0.0294	0.732	0.59	0.85
	NIE2	0.722	0.0284	0.852		
	NIE3	0.608	0.0285	0.760		
	NIE4	0.547	0.0284	0.703		
EB	EB1	0.631	0.0398	0.611	0.51	0.81
	EB2	0.602	0.0354	0.649		
	EB3	0.836	0.0364	0.817		
	EB4	0.726	0.0383	0.775		

**Table 5 Standardized Direct Effects of the entrepreneurial behavior of Saudi female digital entrepreneurs.**

Path/effect	Standardized		p
	$\beta$	SE	
RIE $\rightarrow$ EB	0.090	0.054	0.095
CIE $\rightarrow$ EB	0.105	0.042	0.013
NIE $\rightarrow$ EB	0.198	0.061	0.001

**Table 6 Summary results for significance of control variables on the dependent variable.**

Variables	EB
Age	$\beta = 0.037, p = 0.262$
Education	$\beta = -0.045, p = 0.159$
Years of running the business	$\beta = 0.112, p = 0.004^{**}$
Number of employees	$\beta = 0.187, p > 0.001^{***}$

$\beta$  = standardized weights; \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$

relationship between the RIE and female entrepreneurial activities (Alkhalidi et al. 2018; Bui et al. 2018; Griffy-Brown 2011); however, the study results support the findings of Aljarodi et al. (2023), which indicated no relationship between the regulatory environment and the EB of the entrepreneurs.

The relationship between the CIE dimension and EB is significant, supporting Hypothesis 2 ( $\beta = 0.105, p = 0.013$ ). Additionally, the study results are in line with the results of Aljarodi et al. (2022), Alkhalidi et al. (2018), and Farashah (2015), indicating a significant and positive relationship between the NIE dimension and EB of the entrepreneurs. The relationship between the NIE dimension and EB of female digital entrepreneurs significantly supported Hypothesis 3 ( $\beta = 0.198, p = 0.001$ ). Our results show a positive relationship between the NIE dimension and EB of female digital entrepreneurs, consistent with previous research (Aljarodi et al. 2022; Danish and Smith, 2012; and Welsh et al. 2014).

**Effects of control variables.** The study's controlled variables are age, education, years of operating the business, and the number of employees. Including control variables in the model is expected to reduce confounding effects due to possible differences in the entrepreneurs' socio-demographic background (Reynolds 2000) and possible variation in the years of experience and the number of employees. Table 6 shows the significance of the control variables (age, education, years of running the business, and number of employees) on the dependent variable (EB). The results confirmed that age and educational background are insignificant predictors of females entrepreneurs' EB. Nevertheless, the number of employees and years running the business are positively and significantly related to EB. The coefficient of the number of employees is positive and significant ( $\beta = 0.187, p > 0.001$ ), the same as the coefficient of years of running the business ( $\beta = 0.112, p = 0.004$ ). Although the number of employees and years of running the business positively impacted the dependent variable, their inclusion did not affect the relationships in the SEM model. Thus, controlling for these variables is not required.

## Discussion

Social contexts influence entrepreneurship and entrepreneurial activities (Lumpkin et al. 2013; Welter 2011; Welter et al. 2014). The interaction between the social, economic, and political

contexts with the entrepreneurs' personality and ability eventually shapes entrepreneurship practices (Bird and Schjoedt 2017). The results indicate that IEs also shape entrepreneurship practices within a nation (Busenitz et al. 2000; Ferri and Urbano 2017; North, 1991; Urbano and Alvarez 2014; Veciana and Urbano 2008). Considering the importance of the IE, this study examined the impact of each pillar (dimension) on the EB of Saudi female digital entrepreneurs.

**Regulatory institutional environment and entrepreneurial behavior.** The study hypothesized that the RIE positively affects Saudi female digital entrepreneurs' behavior. According to the study results, Hypothesis 1 was not validated. This contradicts previous study results that established the existence of a positive relationship between RIE and entrepreneurial outcomes of existing and potential entrepreneurs (Griffy-Brown 2011; You-safzai et al. 2015; Alkhalidi et al. 2018; Bui et al. 2018).

In contrast, two studies noted no impact of the RIE on the behavior of female entrepreneurs. A recent study on early-stage entrepreneurs highlighted that formal IE (i.e., regulations, laws, and policies) does not influence their entrepreneurial activities (Aljarodi et al. 2022). Faisal et al. (2017) suggested that Saudi female entrepreneurs may encounter different obstacles, such as a lack of a supportive regulatory environment, which may explain the results of this study as opposed to the others (Aljarodi et al. 2023). Another study conducted on ungraduated students supports the study results that the RIE in Saudi Arabia has a lesser effect on entrepreneurship compared to CIE and NIE (Aloulou 2022).

One of the potential reasons why RIE has no impact on the behavior of female entrepreneurs is that this study and that by Aljarodi et al. (2023) were implemented post-pandemic, while the study by Alkhalidi et al. (2018) was conducted before the Covid-19 pandemic and two years after the economic and social reforms were announced in 2016. The timing might indicate that laws and legislations aimed at promoting entrepreneurial activities and recognizing and removing barriers do not influence females' EB anymore, potentially due to the problems associated with the pandemic, such as shortage of labor and funds and supply chain disruptions. Another possible reason is that the policies and regulatory system aimed at enhancing entrepreneurial activities were deemed insufficiently supportive of Saudi female entrepreneurs. The needs and goals of these entrepreneurs do not align with the support provided within the framework, highlighting a disconnect between the females' perceptions of effective policies and the newly introduced policies. For these reasons, policy-makers are advised to revisit business startup procedures and financial and non-financial assistance; this is critical since the pandemic has changed businesses shape and the challenges entrepreneurs encounter globally (Kuckertz and Brändle, 2022).

**Cognitive institutional environment and entrepreneurial behavior.** The study hypothesized that the CIE positively affects female digital entrepreneurs' behavior. Results support Hypothesis 2. Consistent with the literature (Alkhalidi et al. 2018; Bui et al. 2018; Naguib and Jamali 2015; Urban 2013a; Urbano and Alvarez 2014), this study established that the CIE positively influences female entrepreneurs' decisions to pursue an entrepreneurial career. To a large extent, a nation's level of entrepreneurial intentions is determined by the availability of knowledge and information about business creation and management (Busenitz et al. 2000).

This demonstrates the significance of shared social knowledge and skills about the startup formation process in promoting and increasing entrepreneurial activity rates (Farashah 2015).



Furthermore, promotion initiatives that aim to promote the entrepreneurial career as a respected and admired career option associated with positive economic and social outcomes may enhance the CIE within a country (Farashah 2015). Entrepreneurs' information and knowledge base were found to directly support Saudi female entrepreneurs while launching or operating a new business (Welsh et al. 2014). Similarly, Danish and Smith (2012) identified a set of success factors that affected their success. Among the most prominent success factors is female entrepreneurs' management information and skills.

Previous studies on Saudi early-stage entrepreneurs demonstrated that favorable cognitive institutions positively support entrepreneurs; therefore, the current study's findings corroborate those of earlier studies on early-stage entrepreneurship (Aljarodi et al. 2023; Alkhaldi et al. 2018). Shared social knowledge and skills regarding starting a business might play a significant role in shaping the CIE in Saudi Arabia; this is expected to influence the EB of Saudi female digital entrepreneurs and play a significant role in promoting or inhibiting female DE.

**Normative institutional environment and entrepreneurial behavior.** The study hypothesized that the CIE positively affects Saudi female digital entrepreneurs' behavior. The study results supported Hypothesis 3. These results corroborate a large number of studies in the field of entrepreneurship in general (Arabiyat et al. 2019; Urban 2013b) and female entrepreneurship in particular (Naguib and Jamali 2015; Sadi and Al-Ghazali 2012; Yousafzai et al. 2015, 2019)).

The interaction between the regulative, cognitive, and normative dimensions impacts females' motivation for entrepreneurship and later business performance (Yousafzai et al. 2015). Interestingly, Hechavarria and Reynolds (2009) revealed that half of the variations in motivation for entrepreneurship are explained by cultural norms and values; this supports earlier findings, highlighting the importance of normative institutions in promoting or inhibiting the motivation toward pursuing an entrepreneurial career (Urbano et al. 2020; Baughn and Neupert 2003). Social acceptance of entrepreneurial career paths varies by country; some countries encourage and support entrepreneurship, while others inhibit such activities by challenging the entrepreneurs' ability to pursue it (Baumol et al. 2008). The NIE represented by values, norms, and social support might inhibit the development of entrepreneurship and entrepreneurial self-efficacy (Farashah 2015). Moreover, early-stage Saudi female entrepreneurs are more likely to be influenced by informal institutions than their male counterparts (Aljarodi et al. 2023). Therefore, these significant findings suggest that norms and values within the society in Saudi Arabia may play a significant role in shaping the normative IE; results indicate that the IE, particularly the informal (cognitive and normative) environment, positively influences the behavior of female digital entrepreneurs in Saudi Arabia.

**The impact of control variables on EB.** The study's analysis of the control variables suggests a need to further explore the relationship between informal institutions and the business life cycle (i.e., years of running the business). Studies in entrepreneurship controlled for the possible effect of the business life cycle, which might strongly influence entrepreneurial success and commitment (Acs and Armington 2004). Additionally, the results recommend exploring how the number of employees may influence the relationship between IE and EB. Bruderl et al. (1992) observed that the number of employees, among other factors, strongly predicts business survival. This suggests that a larger number of employees and extensive experience in running a business are associated with more pronounced EB. This effect

may reflect the increased scale and complexity of business operational activities, which could impact entrepreneurial outcomes (i.e., behaviors).

According to the literature, education significantly impacts people's decisions to pursue an entrepreneurial career path (Aljarodi et al. 2022; Dickson et al. 2008; Hattab 2014; Lu and Tao 2010); further, age also directly influences the propensity to become an entrepreneur (Lu and Tao, 2010). Empirical evidence shows that the likelihood of becoming an entrepreneur varies with age (Özdemir and Karadeniz 2011). Recent studies show that age strongly predicts students' entrepreneurial intentions (Sansone et al. 2021) and the entrepreneurial activities of men and women (Aljarodi et al. 2023). Despite the agreement on the positive effect of age and education, this study did not find a significant impact of these control variables on the relationship between IE and EB. Such contradictions in the influence of age and education as control variables are specific to the context of Saudi Arabia.

## Conclusion

The study examined the IE's influence on female digital entrepreneurs' EB in Saudi Arabia. More specifically, this study investigated the impact of each dimension of the CIP, namely, regulatory, cognitive and normative IEs, on the EB of Saudi female digital entrepreneurs. SEM was used to test the hypotheses. The results indicate that cognitive and normative IEs positively impact female entrepreneurs' behavior, unlike the RIE. More specifically, this study analyzed the effects of various institutional (informal) factors, such as shared knowledge and skills for starting a new business and norms and values about entrepreneurship, that influence the EB of female digital entrepreneurs. Therefore, this study contributes to the literature by presenting a framework that offers increased insight into the various institutional factors affecting female DE and provides empirical evidence of the institutions' role in DE using the lens of institutional theory.

**Research implications.** This study has important theoretical and practical implications for entrepreneurship research and practice. Regarding the theoretical implications, a framework that employs the institutional theory offers more insight into the different institutional factors affecting female digital entrepreneurs in Saudi Arabia. Although previous studies have widely discussed the IEs' impacts, institutions' influence in developing and emerging economies is largely ignored. This study found that CIE and NIE are significant predictors of female entrepreneurs' EB. In contrast, RIE does not influence female entrepreneurs' EB; therefore, this study's contribution to the literature highlights the conditions under which EB is promoted. Additionally, this study extends the previous work by revealing the possible effect of the business life cycle and the number of employees on EB.

Further, our results suggest that utilizing CIP and investigating a country's cognitive, normative, and regulative aspects and their effects separately would reveal different results than examining CIP as a whole. The study also has several practical implications for governments, SMEs, and females working in male-dominated industries. These implications are visible in different dimensions, such as shared knowledge, business skills, women working in male-dominated industries, government-supported initiatives and programs, laws, and regulations.

This study provides empirical results for governments and policymakers in Saudi Arabia and similar contexts on the impact of institutional dimensions on female digital entrepreneurs' pursuits. The positive perception of the CIE suggests that shared knowledge and skills about starting a business can be critical

factors in motivating female entrepreneurs. A strong business knowledge base and managerial skills have promoted such entrepreneurial activities among females in Saudi Arabia (Welsh et al. 2014). Furthermore, the positive perception of the NIE implies that norms and values about entrepreneurship as an admired career path are evident as a vital factor. The government-sponsored programs to change societal and cultural perceptions regarding entrepreneurship as a respectable career path for Saudi women have proven effective.

The findings provide noteworthy insights into females working in male-dominated industries in similar contexts (i.e., MENA regions), confirming that technological support could help females take advantage of newly emerging opportunities and the flexibility associated with DE. As a result, the findings could be of interest to governments and policymakers to understand and explore what motivates female entrepreneurs and examine the reasons behind females' underrepresentation in the workforce; the results could be used to propose appropriate policies to encourage female labor force's participation and, thereby, tap their true potential. Government support initiatives and programs were found to be effective and increase the number of enterprises significantly; however, the results showed that the laws and regulations introduced to increase female participation in entrepreneurial activities need to be revisited for amendments, especially in post-pandemic years. This finding suggests that policymakers in Saudi Arabia may wish to reevaluate and assess existing government support programs and current policies and practices through multiple lenses (incorporating entrepreneurs' perceptions, potential entrepreneurs' views, expert views in the entrepreneurship field, and the industry) to increase their impact on the rate of existing and potential entrepreneurial activities. This assessment can aid policymakers in removing barriers to female entrepreneurship (Welsh et al. 2014). Governments that aim to diversify the economy, decrease government jobs, and increase the number of SMEs should consider boosting the entrepreneurial spirit and activities by investing in training and education (Simón-Moya et al. 2014). Furthermore, it can support efforts to reduce unemployment by creating more jobs in the private sector and improving economic growth.

#### Research limitations and future research recommendations.

The sample involved Saudi female digital entrepreneurs; thus, more research is essential to establish the extent to which these findings could be tested in other contexts for generalizability. Moreover, broadening the sample to the Gulf countries for comparative studies between female digital entrepreneurs in the region would be interesting as these countries share a common language, religion, and culture. Future research may also plan to compare female digital entrepreneurs to their male counterparts. This comparison should enhance our understanding of the reasons for the gender divide in DE and how each gender perceives the IE, whether it promotes or inhibits their entrepreneurial activities.

The nature of the study and the limited time and resources necessitated adopting a cross-sectional design, limiting the ability to derive a causal relationship; hence, a longitudinal study would offer a new aspect of research enriching the current study's findings. Using self-rating assessments from a single source, which may be a potential source for CMV, is also one of the research limitations. Therefore, to overcome the possible issue of CMV, researchers may consider incorporating the views of national entrepreneurship experts and entrepreneurs (i.e., gathering data from two sources) to better examine the effect of CIP on entrepreneurial activity rates and types and enrich the current

research findings. Along with the institutional factors, researchers may examine the impact of other factors like entrepreneurship education, ICT knowledge capacity, and work-family conflict on female digital entrepreneurs' career decisions and business sustainability.

#### Data availability

The datasets generated and analyzed during the current study are not publicly available, but are available from the corresponding author on a reasonable request.

Received: 29 May 2024; Accepted: 27 February 2025;

Published online: 28 April 2025

#### References

- Acis Z, Armstrong C (2004) Employment growth and entrepreneurial activity in cities. *Reg Stud* 38:911–927. <https://doi.org/10.1080/0034340042000280938>
- Acis Z, Åstebro T, Audretsch D, Robinson DT (2016) Public policy to promote entrepreneurship: a call to arms. *Small Bus Econ* 47:35–51. <https://doi.org/10.1007/s11187-016-9712-2>
- Ahmad SZ (2011) Evidence of the characteristics of women entrepreneurs in the Kingdom of Saudi Arabia. *Int J Gend Entrep* 3:123–143
- Alhajri A, Aloud M (2024) Female digital entrepreneurship: a structured literature review. *Int J Entrep Behav Res* 30:369–397. <https://doi.org/10.1108/IJEBR-09-2022-0790>
- Aljarodi A, Thatchenkery T, Urbano D (2023) The influence of institutions on early-stage entrepreneurial activity: a comparison between men and women in Saudi Arabia. *J Entrep Emerg Econ* 15:1028–1049. <https://doi.org/10.1108/JEEE-02-2021-0076>
- Aljarodi A, Thatchenkery T, Urbano D (2022) Female entrepreneurial activity and institutions: empirical evidence from Saudi Arabia. *Res Glob* 100102. <https://doi.org/10.1016/j.resglo.2022.100102>
- Alkhalidi T, Cleeve E, Brander-Brown J (2018) Formal institutional support for early-stage entrepreneurs: evidence from Saudi Arabia. In: *European conference on innovation and entrepreneurship*. Academic Conferences International Limited
- Alkhaled S, Berglund K (2018) And now I'm free': Women's empowerment and emancipation through entrepreneurship in Saudi Arabia and Sweden. *Entrep Reg Dev* 30:877–900
- Al-Kwif OS, Tien Khoa T, Ongsakul V, Ahmed ZU (2020) Determinants of female entrepreneurship success across Saudi Arabia. *J. Transnatl. Manag* 25:3–29
- Al-Mamary YHS, Abdulrab M, Alwaheeb MA, Alshammari NGM (2020) Factors impacting entrepreneurial intentions among university students in Saudi Arabia: testing an integrated model of TPB and EO. *Educ Train* 62:779–803. <https://doi.org/10.1108/ET-04-2020-0096>
- Almunajjed M (2010) Women's employment in Saudi Arabia a major challenge. Booz & Company
- Alomar JA (2023) Assessing factors influencing female entrepreneurship intentions and behaviour. *FIIB Bus Rev* 231971452211463. <https://doi.org/10.1177/23197145221146348>
- Aloulou WJ (2022) The influence of institutional context on entrepreneurial intention: evidence from the Saudi young community. *J Enterp Communities* 16:677–698. <https://doi.org/10.1108/JEC-02-2021-0019>
- Alshebami AS, Seraj AHA (2022) Investigating the impact of institutions on small business creation among Saudi entrepreneurs. *Front Psychol* 13. <https://doi.org/10.3389/fpsyg.2022.897787>
- Althathini D, Tlais HA (2023) Of resistance to patriarchy and occupation through a virtual bazaar: an institutional theory critique of the emancipatory potential of Palestinian women's digital entrepreneurship. *Entrep Reg Dev* 35:956–978. <https://doi.org/10.1080/08985626.2023.2241412>
- Aparicio S, Urbano D, Audretsch D (2016) Institutional factors, opportunity entrepreneurship and economic growth: panel data evidence. *Technol Forecast Soc Change* 102:45–61. <https://doi.org/10.1016/j.techfore.2015.04.006>
- Arabiyat TS, Mdanat M, Haffar M et al. (2019) The influence of institutional and conducive aspects on entrepreneurial innovation: Evidence from GEM data. *J Enterp Inf Manag* 32:366–389
- Basaffar AA, Niehm LS, Bosselman R (2018) Saudi Arabian women in entrepreneurship: challenges, opportunities and potential. *J Dev Entrep* 23:1–21
- Baughn CC, Neupert KE (2003) Culture and national conditions facilitating entrepreneurial start-ups. *J Int Entrep* 1:313–330
- Baumol WJ (1990) Entrepreneurship: productive, unproductive, and destructive. *J Polit Econ* 98:893–921

- Baumol WJ, Litan RE, Schramm CJ (2008) Good capitalism, bad capitalism, and the economics of growth and prosperity. Yale University
- Beliaeva T, Ferraso M, Kraus S (2020) Dynamics of digital entrepreneurship and the innovation ecosystem a multilevel perspective. *Int J Entrep Behav Res* 26:266–284. <https://doi.org/10.1108/IJEBR-06-2019-0397>
- Berger ESC, von Briel F, Davidsson P, Kuckertz A (2021) Digital or not—the future of entrepreneurship and innovation: introduction to the special issue. *J. Bus. Res* 125:436–442
- Bird B, Schjoedt L (2017) Entrepreneurial behavior: its nature, scope, recent research, and agenda for future research. In: Brännback M, Carsrud A (eds) *Revisiting the entrepreneurial mind*. International studies in entrepreneurship. Springer, Cham
- Bruderl J, Preisendorfer P, Ziegler R (1992) Survival chances of newly founded business organizations. *Am Socio Rev* 57:227. <https://doi.org/10.2307/2096207>
- Bui HTM, Kuan A, Chu TT (2018) Female entrepreneurship in patriarchal society: motivation and challenges. *Small Bus Entrep* 30:325–343. <https://doi.org/10.1080/08276331.2018.1435841>
- Busenitz LW, Gómez C, Spencer JW (2000) Country institutional profiles: unlocking entrepreneurial phenomena. *Acad Manag J* 43:994–1003. <https://doi.org/10.2307/1556423>
- Campbell J (2020) *Institutional change and globalization*. Princeton University Press, Princeton, NJ
- Dana LP, Crocco E, Culasso F, Giacosa E (2024) Mapping the field of digital entrepreneurship: a topic modeling approach. *Int Entrep Manag J* 20:1011–1045. <https://doi.org/10.1007/s11365-023-00926-6>
- Danish AY, Smith HL (2012) Female entrepreneurship in Saudi Arabia: opportunities and challenges. *Int J Gend Entrep* 4:216–235. <https://doi.org/10.1108/17566261211264136>
- de Vaus D (2013) *Surveys in social research*. Routledge, <https://doi.org/10.4324/9780203519196>
- Díaz-Casero JC, Ferreira JJM, Mogollón RH, Raposo MLB (2012) Influence of institutional environment on entrepreneurial intention: A comparative study of two countries university students. *Int Entrep Manag J* 8:55–74
- Dickson PH, Solomon GT, Weaver KM (2008) Entrepreneurial selection and success: does education matter? *J Small Bus Entrep* 15:239–258. <https://doi.org/10.1108/14626000810871655>
- DiMaggio PJ, Powell WW (2004) The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. In: Dobbin F (ed) *The new economic sociology*. Princeton University Press, pp 111–134. <https://doi.org/10.1515/9780691229270-005>
- Dimitrov DM (2012) Statistical methods for validation of assessment scale data in counseling and related fields. American Counseling Association - Alexandria, Virg
- Elamin AM, Omair K (2010) Males' attitudes towards working females in Saudi Arabia. *Pers Rev* 39:746–766. <https://doi.org/10.1108/00483481011075594>
- Faisal MN, Jabeen F, Katsioloudes M (2017) Strategic interventions to improve women entrepreneurship in GCC countries: A relationship modeling approach *J Entrep Emerg Econ* 9(2):161–180
- Farashah A (2015) The effects of demographic, cognitive and institutional factors on development of entrepreneurial intention: Toward a socio-cognitive model of entrepreneurial career. *J Int Entrep* 13:452–476. <https://doi.org/10.1007/s10843-015-0144-x>
- Ferri E, Urbano D (2017) Exploring how institutions influence social and commercial entrepreneurship: an international study. In: *Entrepreneurship: Concepts, methodologies, tools, and applications*. IGI Global, pp 1253–1267
- Fornell C, Larcker DF (1981) Evaluating structural equation models with unobservable variables and measurement error. *J Mark Res* 18:39–50. <https://doi.org/10.1177/002224378101800104>
- GEM (2019) *Global entrepreneurship monitor: 2018/2019 global report*. Available at <https://www.gemconsortium.org/report/gem-2018-2019-global-report>
- GEM (2020) *Global entrepreneurship monitor: 2019/2020 global report*. Available at <https://www.gemconsortium.org/report/gem-2019-2020-global-report>
- GEM (2023) *Global entrepreneurship monitor 2022/2023 global report: adapting to a "new normal"*, GEM, London. Available at <https://gemconsortium.org/report/20222023-global-entrepreneurship-monitor-global-report-adapting-to-a-new-normal-2>
- Gieure C, Benavides-Espinosa MdelM, Roig-Dobón S (2020) The entrepreneurial process: the link between intentions and behavior. *J Bus Res* 112:541–548. <https://doi.org/10.1016/j.jbusres.2019.11.088>
- Griffy-Brown C (2011) Supporting the emergence of women's entrepreneurship: regulative, institutional and technological changes in Japan. *Int J Gend Entrep* 3:75–78
- Gupta VK, Guo C, Canever M et al. (2014) Institutional environment for entrepreneurship in rapidly emerging major economies: the case of Brazil, China, India, and Korea. *Int Entrep Manag J* 10:367–384
- Hair J, Black WC, Babin BJ, Anderson RE (2014) *Multivariate data analysis*, 7th edn. Pearson, Essex
- Hashim S (2023) Women entrepreneurs in the Gulf States: taking stock and moving forward. *Entrep Reg Dev* 35:841–884. <https://doi.org/10.1080/08985626.2023.2227977>
- Hashim S, McAdam M, Nordqvist M (2024) An exploration of women entrepreneurs 'doing context' in family business in the Gulf States. *Int J Gend Entrep* (ahead-of-print) <https://doi.org/10.1108/IJGE-02-2023-0037>
- Hattab HW (2014) Impact of entrepreneurship education on entrepreneurial intentions of University Students in Egypt. *J Entrep* 23:1–18. <https://doi.org/10.1177/0971355713513346>
- Hechavarria DM, Reynolds PD (2009) Cultural norms & business start-ups: the impact of national values on opportunity and necessity entrepreneurs. *Int Entrep Manag J* 5:417–437. <https://doi.org/10.1007/s11365-009-0115-6>
- Hu L, Bentler PM (1999) Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Struct Equ Modeling* 6:1–55. <https://doi.org/10.1080/10705519909540118>
- Hull CE, Hung YTC, Hair N, Perotti V, DeMartino R (2007) Taking advantage of digital opportunities: a typology of digital entrepreneurship. *Int J Netw Virtual Organ* 4:290. <https://doi.org/10.1504/IJNVO.2007.015166>
- International Labour Organization (2024). *World employment and social outlook, ILO*. Available at <https://www.ilo.org/publications/flagship-reports/world-employment-and-social-outlook-trends-2024>
- Jabeen F, Katsioloudes MI, Das SS (2015) Is family the key? Exploring the motivation and success factors of female Emirati entrepreneurs. *Int J Entrep Small Bus* 25:375–394
- Kelly D, Roomi M, Hashmi N, Coduras A (2022) Kingdom of Saudi Arabia women's report 2021–2022, King Abdullah Economic City: Prince Mohammed Bin Salman College. Available at [https://www.mbsc.edu.sa/ar/wp-content/uploads/sites/5/2023/02/GEM-KSA-Womens-Report\\_2022\\_English.pdf](https://www.mbsc.edu.sa/ar/wp-content/uploads/sites/5/2023/02/GEM-KSA-Womens-Report_2022_English.pdf)
- Khizindar TM, Darley WK (2017) A study of female Middle Eastern entrepreneurs: a resource-based view. *Res Mark Entrep* 19:42–58. <https://doi.org/10.1108/JRME-07-2016-0023>
- Kline R (2016) *Principles and practice of structural equation modeling* (DA Kenny & TD Little, eds.) Guilford publications
- Kolvereid L, Isaksen E (2006) New business start-up and subsequent entry into self-employment. *J Bus Ventur* 21:866–885. <https://doi.org/10.1016/j.jbusvent.2005.06.008>
- Kostova T (1997) Country institutional profiles: concept and measurement. *Acad Manag Proc* 1997:180–184. <https://doi.org/10.5465/ambpp.1997.4981338>
- Kraus S, Palmer C, Kailer N et al. (2019) Digital entrepreneurship: a research agenda on new business models for the twenty-first century. *Int J Entrep Behav Res* 25:353–375
- Kuckertz A, Brändle L (2022) Creative reconstruction: a structured literature review of the early empirical research on the COVID-19 crisis and entrepreneurship. *Manag Rev Q* 72:281–307. <https://doi.org/10.1007/s11301-021-00221-0>
- Lerner J (2021) *Government incentives for entrepreneurship*. Innovation and Public Policy. University of Chicago Press
- Lim DSK, Morse EA, Mitchell RK, Seawright KK (2010) Institutional environment and entrepreneurial cognitions: a comparative business systems perspective. *Entrep Theory Pr* 34:491–516. <https://doi.org/10.1111/j.1540-6520.2010.00384.x>
- Lu J, Tao Z (2010) Determinants of entrepreneurial activities in China. *J Bus Ventur* 25:261–273. <https://doi.org/10.1016/j.jbusvent.2008.10.005>
- Lumpkin GT, Moss TW, Gras DM et al. (2013) Entrepreneurial processes in social contexts: how are they different, if at all? *Small Bus Econ* 40:761–783. <https://doi.org/10.1007/s11187-011-9399-3>
- Manolova T, Eunni R, Gyoshev B (2008) Institutional environments for entrepreneurship: evidence from emerging economies in Eastern Europe. *Entrep Theory Pr* 32:203–218
- Martinez-Dy A, Marlow S, Martin L (2017) A Web of opportunity or the same old story? Women digital entrepreneurs and intersectionality theory. *Hum Relat* 70:286–311
- Martinez-Dy A, Martin L, Marlow S (2018) Emancipation through digital entrepreneurship? A critical realist analysis. *Organization* 25:585–608
- Mathew V (2010) Women entrepreneurship in Middle East: understanding barriers and use of ICT for entrepreneurship development. *Int Entrep Manag J* 6:163–181. <https://doi.org/10.1007/s11365-010-0144-1>
- McAdam M, Crowley C, Harrison RT (2019) "To boldly go where no [man] has gone before" - Institutional voids and the development of women's digital entrepreneurship. *Technol Forecast Soc Change* 146:912–922
- McAdam M, Crowley C, Harrison RT (2020) Correction to: Digital girl: cyberfeminism and the emancipatory potential of digital entrepreneurship in emerging economies. *Small Bus Econ* 55:1179. <https://doi.org/10.1007/s11187-020-00321-3>
- McGowan P, Redeker CL, Cooper SY, Greenan K (2012) Female entrepreneurship and the management of business and domestic roles: Motivations,



- expectations and realities. *Entrep Reg Dev* 24:53–72. <https://doi.org/10.1080/08985626.2012.637351>
- MCIT (2020) Saudi Arabia receives global award for unremitting efforts in advancing digital-related legislative infrastructure. Available at <https://mcit.gov.sa/en/news/saudi-arabia-receives-global-award-unremitting-efforts-advancing-digital-related-legislative>
- Meyer N (2018) Research on female entrepreneurship: are we doing enough? *Pol J Manag Stud* 17:158–169. <https://doi.org/10.17512/pjms.2018.17.2.14>
- Morris MH, Miyasaki NN, Watters CE, Coombes SM (2006) The dilemma of growth: understanding venture size choices of women entrepreneurs. *J Small Bus Manag* 44:221–244. <https://doi.org/10.1111/j.1540-627X.2006.00165.x>
- Naguib R, Jamali D (2015) Female entrepreneurship in the UAE: a multi-level integrative lens *Gend Manag* 30(2):135–161
- Ngoasong MZ (2018) Digital entrepreneurship in a resource-scarce context: a focus on entrepreneurial digital competencies. *J Small Bus Enterp D* 25:483–500. <https://doi.org/10.1108/JSBED-01-2017-0014>
- Nieva FO (2015) Social women entrepreneurship in the Kingdom of Saudi Arabia. *J Glob Entrep Res* 5:1–33. <https://doi.org/10.1186/s40497-015-0028-5>
- Nieva FO (2016) Towards women empowerment: a social entrepreneurship approach in the Kingdom of Saudi Arabia. *Int J. Innov Reg Dev* 7:161–183
- North DC (1991) Institutions. *J. Econ. Perspect.* 5:97–112
- North DC (1994) Economic performance through time. *Am Econ Rev* 84:359–368
- Nowiński W, Yacine M, Wach K, Schaefer R (2020) Perceived public support and entrepreneurship attitudes: a little reciprocity can go a long way! *J. Vocat. Behav.* 121:1–16
- Özdemir Ö, Karadeniz E (2011) Investigating the factors affecting total entrepreneurial activities in Turkey. *METU Stud Dev* 38:275–290
- Paul J, Alhassan I, Binsaf N, Singh P (2023) Digital entrepreneurship research: a systematic review. *J Bus Res* 156:113507. <https://doi.org/10.1016/j.jbusres.2022.113507>
- Pinho JCM, Thompson D (2017) Institutional-driven dimensions and the capacity to start a business: a preliminary study based on two countries. *Int Mark Rev* 34:787–813
- Podsakoff PM, MacKenzie SB, Lee JY, Podsakoff NP (2003) Common method biases in behavioral research: a critical review of the literature and recommended remedies. *J Appl Psychol* 88:879–903. <https://doi.org/10.1037/0021-9010.88.5.879>
- Redien-Collot R, Alexandre R, Aloulou WJ (2017) Saudi women's entrepreneurial intention: the social construction of norms and perception. In: Henry, C, Nelson, T, Lewis, K (eds.), *The Routledge Companion to Global Female Entrepreneurship*, 1st edn., Routledge
- Reynolds PD (2000) National panel study of U.S. business startups: Background and methodology. *Databases Study Entrepreneurship* 4:153–227. [https://doi.org/10.1016/S1074-7540\(00\)04006-X](https://doi.org/10.1016/S1074-7540(00)04006-X)
- Sabri MS, Thomas K (2019) Psycho-attitudinal features: a study of female entrepreneurs in Saudi Arabia. *Int J Gend Entrep* 11:459–480. <https://doi.org/10.1108/IJGE-02-2019-0036>
- Sadi MA, Al-Ghazali BM (2012) The dynamics of entrepreneurial motivation among women: a comparative study of businesswomen in Saudi Arabia and Bahrain. *Asian Acad Manag J* 17:97–113. [https://doi.org/10.1007/978-1-4614-1611-1\\_18](https://doi.org/10.1007/978-1-4614-1611-1_18)
- Sahasranamam S, Nandakumar MK (2020) Individual capital and social entrepreneurship: role of formal institutions. *J Bus Res* 107:104–117
- Sahut J, Landoli L, Teulon F (2021) The age of digital entrepreneurship. *Small Bus Econ* 1–11
- Sansone G, Ughetto E, Landoni P (2021) Entrepreneurial intention: an analysis of the role of Student-Led Entrepreneurial Organizations. *J Int Entrep* 19:399–433. <https://doi.org/10.1007/s10843-021-00288-6>
- Satalkina L, Steiner G (2020) Digital entrepreneurship and its role in innovation systems: a systematic literature review as a basis for future research avenues for sustainable transitions. *Sustainability* 12:1–27
- Scott WR (1995) *Institutions and organizations*. Sage, Thousand Oaks, CA
- Scott WR (2001) *Institutions and organizations*, 2nd edn. Sage, Thousand Oaks, CA
- Scott WR (2014) *Institutions and organizations: ideas, interests, and identities*, 4th edn. Sage, Thousand Oaks, CA
- Simón-Moya V, Revuelto-Taboada L, Guerrero RF (2014) Institutional and economic drivers of entrepreneurship: an international perspective. *J Bus Res* 67:715–721. <https://doi.org/10.1016/j.jbusres.2013.11.033>
- Sobhan N, Hassan A, Crammond RJ (2024) Revisiting the link between entrepreneurship education and female entrepreneurial intention in Bangladesh. In: Crammond, RJ, Hyams-Ssekasi D (eds), *Entrepreneurship education and internationalisation: cases, collaborations and contexts*, Routledge, New York, NY
- Spector P (1993) Using self-report questionnaires in OB research: a comment on the use of a controversial method. *J. Organ Behav.* 15:385–392
- Stenholm P, Acs ZJ, Wuebker R (2013) Exploring country-level institutional arrangements on the rate and type of entrepreneurial activity. *J Bus Ventur* 28:176–193
- Suddaby R, Seidl D, Lê JK (2013) Strategy-as-practice meets neo-institutional theory. *Strateg Organ* 11:329–344. <https://doi.org/10.1177/1476127013497618>
- Sussan F, Acs ZJ (2017) The digital entrepreneurial ecosystem. *Small Bus Econ* 49:55–73. <https://doi.org/10.1007/s11187-017-9867-5>
- Tabachnick B, Fidell L, Ullman J (2019) *Using multivariate statistics*. Pearson, Boston, MA
- Tlaiss HA, Khanin DM, Page S, Al-Mashykeh A (2024) Barriers that disadvantage women face when starting a business in a crises-laden country context. *Acad Manag Proc* 2024:10245. <https://doi.org/10.5465/AMPROC.2024.10245abstract>
- Torkkeli L, Kuivalainen O, Saarenketo S, Puimalainen K (2019) Institutional environment and network competence in successful SME internationalization. *Int Mark Rev* 36:31–55
- Tracey P (2012) Entrepreneurship and neo-institutional theory. In: Mole J, Ram M (eds) *Perspectives in entrepreneurship: a critical approach*. Macmillan Education UK, London, pp 93–106
- Ughetto E, Rossi M, Audretsch D, Lehmann EE (2020) Female entrepreneurship in the digital era". *Small Bus Econ* 55:305–312
- Urban B (2013a) A focus on the institutional environment and social entrepreneurial self-efficacy. *Manag Glob Transit* 11:3–25
- Urban B (2013b) Influence of the institutional environment on entrepreneurial intentions in an emerging economy. *Int J Entrep Innov* 14:179–191
- Urban B, Kujianga L (2017) The institutional environment and social entrepreneurship intentions. *Int J Entrep Behav Res* 23:638–655
- Urbano D, Alvarez C (2014) Institutional dimensions and entrepreneurial activity: an international study. *Small Bus Econ* 42:703–716. <https://doi.org/10.1007/s11187-013-9523-7>
- Urbano D, Toledano N, Soriano DR (2010) Analyzing social entrepreneurship from an institutional perspective: evidence from Spain. *J Soc Entrep* 1:54–69
- Urbano D, Audretsch D, Aparicio S, Noguera M (2020) Does entrepreneurial activity matter for economic growth in developing countries? The role of the institutional environment. *Int Entrep Manag J* 16:1065–1099
- Veciana JM, Urbano D (2008) The institutional approach to entrepreneurship research. Introduction. *Int Entrep Manag J* 4:365–379. <https://doi.org/10.1007/s11365-008-0081-4>
- Welsh DHB, Memili E, Kaciak E, Al Sadoon A (2014) Saudi women entrepreneurs: a growing economic segment. *J Bus Res* 67:758–762
- Welter F (2011) Contextualizing entrepreneurship—conceptual challenges and ways forward. *Entrep Theory Pr* 35:165–184. <https://doi.org/10.1111/j.1540-6520.2010.00427.x>
- Welter F, Brush C, de Bruin A (2014) The gendering of entrepreneurship context. Institut für Mittelstandsforschung (IfM), Bonn
- Yousafzai S, Saeed S, Muffatto M (2015) Institutional theory and contextual embeddedness of women's entrepreneurial leadership: evidence from 92 countries. *J Small Bus Manag* 53:587–604
- Yousafzai S, Fayolle A, Saeed S, Henry C, Lindgreen A (2019) The contextual embeddedness of women's entrepreneurship: towards a more informed research agenda. *Entrep Reg Dev* 31:167–177
- Zhao X, Lin C, Knerr-Sievers B, Lu Q, Mardani A (2023) The impact of institutional environment on entrepreneurial performance in micro E-commerce for Women: the mediating role of entrepreneurial network. *J Bus Res* 154:113313. <https://doi.org/10.1016/j.jbusres.2022.113313>

## Acknowledgements

The authors would like to acknowledge the fund and support by Imam Mohammad Ibn Saud Islamic University (IMSIU).

## Author contributions

All authors have read, thoroughly reviewed, and approved the final submitted manuscript for publication.

## Funding

This work was supported by and funded by the Deanship of Scientific Research at Imam Mohammad Ibn Saud Islamic University (IMSIU) (grant number IMSIU-DDRSP2504).

## Competing interests

The authors declare no competing interests.

## Ethical approval

The research was carried out in accordance with the Helsinki Declaration guidelines and has been approved on October 2021 by the Permanent Committee for Scientific Research Ethics at the Deanship of Scientific Research, King Saud University (Ref No: KSU-HE-21-590).



### Informed consent

The survey was conducted after informed consent was obtained from participants prior to their participation. Participants agreed to provide data for the study and were informed of their rights throughout and after the data collection process.

### Additional information

**Supplementary information** The online version contains supplementary material available at <https://doi.org/10.1057/s41599-025-04686-2>.

**Correspondence** and requests for materials should be addressed to Abrar Alhajri.

**Reprints and permission information** is available at <http://www.nature.com/reprints>

**Publisher's note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.



**Open Access** This article is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License, which permits any non-commercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if you modified the licensed material. You do not have permission under this licence to share adapted material derived from this article or parts of it. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by-nc-nd/4.0/>.

© The Author(s) 2025