



ARTICLE



<https://doi.org/10.1057/s41599-025-05265-1>

OPEN

# The effect of psychological, market, economic, socio-cultural, entrepreneurial orientation and educational and skills factors on empowering women for new venture creation

Yaser Hasan Al-Mamary <sup>1,2✉</sup>, Aliyu Alhaji Abubakar <sup>1,2</sup> & Adel Abdulmohsen Alfalah<sup>1,2</sup>

This study analyses the impact of a number of factors on women's empowerment to start a new business in Saudi Arabia. The research focuses on various factors, such as psychological, market conditions, economic, socio-cultural, entrepreneurial orientation, and education and skills factors, to understand the influence of these factors on women entrepreneurs in Saudi Arabia. Thus, the study includes 311 women entrepreneurs who live in Saudi Arabia. The data collection instrument consists of a five-point Likert scale questionnaire, which participants accessed through online platforms. The study hypothesis stated that these factors create a substantial effect on women's empowerment in entrepreneurship in Saudi Arabia. SPSS version 25.0 was used to analyse the respondent characteristics and demographic information, while PLS/SEM was used to analyse the interrelationship that exists between the postulated variables. The results show that psychological, economic, entrepreneurial orientation, and education and skills factors are the most important factors that can help women to become successful in business ventures in Saudi Arabia. On the contrary, market conditions and the sociocultural factor were found to have no effect on women's empowerment in entrepreneurship. Hence, it is recommended that strategies be developed to address these factors in order to enhance the effectiveness of women entrepreneurs in Saudi Arabia. The research offers additional insight by highlighting that these findings differ from previous studies, particularly regarding the minimal influence of market conditions and the socio-cultural factor. The study results offer important information to policymakers and stakeholders who need to create appropriate interventions for women entrepreneurs that support the sustainable development goals of Saudi Arabian Vision 2030. This research addresses this gap by providing substantial knowledge about the factors influencing the Saudi Arabian entrepreneurial environment.

<sup>1</sup> Department of Management and Information Systems, College of Business Administration, University of Ha'il, Hail, Saudi Arabia. <sup>2</sup> Humanities Research Centre, University of Ha'il, Hail, Saudi Arabia. ✉email: [y.alwan@uoh.edu.sa](mailto:y.alwan@uoh.edu.sa); [yaser\\_almamary@yahoo.com](mailto:yaser_almamary@yahoo.com)

## Introduction

Women entrepreneurs are increasingly becoming the key drivers of economic growth and prosperity, especially in the developing countries (Al-Mamary and Abubakar, 2023). According to Kumari et al. (2024) and Orozco Collazos, Botero (2024), women entrepreneurs are those who establish, coordinate, and direct business concerns. They are usually owners and decision-makers of at least 51% of the capital and have a similar percentage of women in their business. The general nature and size of the business owned by women can vary widely, but many tend to be small- to medium-sized enterprises (SMEs). According to the International Finance Corporation, women-owned SMEs represent about 90% of all companies and more than 50% of all employment (Abdallah et al., 2024), and they often operate in sectors such as retail, services, and hospitality, which are traditionally more accessible to women (Hussain et al., 2024; Yoopetch, 2021).

Women entrepreneurs in Saudi Arabia launch businesses based on their abilities and passions by establishing companies in the fashion, beauty, education, and health services sectors (Sabri, 2021). The expansion of women-owned businesses remains difficult because they lack sufficient resources and professional connections. According to Nigam and Shatila (2024), women business owners experience fifty percent lower success in obtaining business funding compared to male entrepreneurs, thus restricting their business expansion. Women entrepreneurs face numerous challenges, but they remain essential to local economies because they generate employment opportunities and economic diversification. The sustainable development of these businesses requires support because it leads to improved economic empowerment for women and stronger overall economic growth.

Academics and development sectors have taken notice of women entrepreneurs because of both push and pull factors. The push factors consist of family responsibilities and societal expectations, yet the pull factors consist of independence and self-fulfillment. Women entrepreneurs encounter substantial social and cultural obstacles because of established traditions and male leadership dominance. Women's empowerment emerges from their forceful behavior together with their willingness to take risks and their dedication and determination (Amini et al., 2024).

The growing educational access and shifting expectations enable women to enter business competition with men in all sectors. Women entrepreneurs receive recognition for their accomplishments because they demonstrate leadership abilities and motivation skills, which prove essential for economic and social development, according to Koneru (2017). Female entrepreneurs represent the fastest-growing entrepreneurial group worldwide and have become a primary focus of academic research, according to Cardella et al. (2020). Through their job creation and GDP growth, women entrepreneurs drive economic development, which helps decrease poverty and social exclusion. The number of women who choose entrepreneurship continues to lag behind male entrepreneurs, especially in advanced economies (Corrêa et al., 2024). The gap exists because of unequal property rights distribution and economic resources, male-dominated informal networks, and gender-biased regulations and policies.

Raza et al. (2024) discovered that social roles, together with stereotypes, actively prevent women from starting businesses because society believes entrepreneurship conflicts with traditional gender norms. Research indicates that women establish businesses because they require flexibility, which traditional employment does not provide when they need to manage work and family responsibilities. The path to business ownership remains challenging for women because they face two major

obstacles: securing support and overcoming their fear of failure. The complex nature of female entrepreneurship requires detailed analysis of their distinct motivations and barriers to success, while ongoing research and policy support remain essential for achieving gender equality in business ownership.

The study of women entrepreneurs remains crucial for today because numerous nations and communities show rising female empowerment through economic and business involvement. The cultural shift demonstrates the growing gender equality movement, which acknowledges women's broad potential for entrepreneurial activities. The global economy relies on innovation and entrepreneurial spirit, so this topic is very important in its current state (Alreshoodi et al., 2022; Al-Mamary and Abubakar, 2023).

The small and medium-sized businesses, together with entrepreneurship, serve as the two modern concepts which drive economic development and create new employment opportunities. The kingdom's progressive changes towards women's empowerment and labor market access have drastically led to the increased entrepreneurial activities among the Saudi Arabian women (Alreshoodi et al. 2022; Al-Mamary and Abubakar, 2023).

The research examines various elements that impact women's empowerment in entrepreneurship in Saudi Arabia by studying psychological factors, together with economic factors, socio-cultural factors, and more. The study evaluates the psychological factors that influence women's business ventures, while focusing on ambiguity tolerances and entrepreneurial drive, also examining the economic opportunities, access to capital, and the societal impacts on women's amateurship empowerment and evaluating the current educational preparation of women for business startup success. The study provides policy recommendations for women entrepreneurs' support while analyzing gender equality and sustainable economic development in Saudi Arabia

## Literature review

**Empowering women entrepreneurs.** Women's entrepreneurship in developing Asian countries holds significant potential for empowering women and transforming society (Khalid et al., 2024), yet this potential remains largely untapped due to lower levels of economic development and industrialization. Women entrepreneurs in these regions often fall into three categories: chance entrepreneurs, who start businesses without clear goals; forced entrepreneurs, driven by financial necessity; and created entrepreneurs, developed through specific programs (Tambunan, 2009). The degree of women's entrepreneurship is closely linked to gender equity, which varies by country and is generally lower in developing countries (Tambunan, 2009).

Economic growth is important for enhancing living standards, reducing poverty, and improving the overall quality of life within a society. According to Hu and Zhou (2024) and Şanlı et al. (2024), global economic growth has the potential to lift millions out of poverty; for instance, a 1% increase in GDP can reduce poverty rates by ~0.7% in developing countries. The growth leads to more employment opportunities, which results in higher incomes and increased consumer spending that drives additional economic activities. According to Timilsina et al. (2024), a growing economy enables the government to obtain more tax revenue, which it can use to fund public services, including education, healthcare, and economic infrastructure. The economic growth plays a crucial role in gender equality because it enables more women to gain employment opportunities and start their businesses in the local area. Yeboah and Mogre (2024) predicted that achieving gender equality in workforce participation would increase global GDP by \$12 trillion, while specific countries could see their economic output rise by 35% by 2025.

Economic growth stands as a vital factor for building an inclusive society that promotes equality.

Agarwal et al. (2020) established that women's entrepreneurship development is crucial for enhancing social and economic development. It will not only be encouraging women to initiate and grow their projects and providing them with the necessary resources, but it will also equally help them to boost the economy, spur innovation, and create more job opportunities. Women can achieve economic sustainability and contribute to the achievement of sustainable development goals because of their leadership in a variety of fields. However, to achieve this, Gupta et al. (2024) express the opinion that it is necessary to remove the barriers and difficulties that women face, whether they have to do with funding, instruction, or direction. Women can truly become entrepreneurs when they receive decision-making power and training in leadership and innovation. This, in turn, helps to create societies that are more economically developed and sustainable (Alreshoodi et al. 2022; Al-Mamary and Abubakar, 2023).

As of 2024, the global labor force participation rate for women was ~53%, compared to 80% for men, highlighting a significant gender gap (Wakibi and Oleche, 2024). In Saudi Arabia, women's participation in the workforce has been increasing due to recent reforms aimed at enhancing gender equality, such as the Vision 2030 initiative, which seeks to raise women's participation in the labor market to 30% by 2030 (Ainurrofiq and Khasanah, 2024; Polok, 2024). The labor force participation rate for women in Saudi Arabia reached 33% during 2020 after starting at 22% in 2016 (Saleh and Malibari, 2021). The workforce participation rate of women remains lower than men's despite progress because cultural obstacles, restricted industry access, and insufficient employment support policies continue to exist.

In addition to traditional economic interventions, Siba (2019) asserts that women entrepreneurs must overcome psychological, social, and skill barriers to achieve empowerment. Based on the findings of Altaf et al. (2024), it can be argued that financial capital or basic business training for female-owned enterprises alone cannot have a major enough impact. The path to successful treatment requires a complete approach which combines business skills with psychological and cultural aspects and financial availability. Women face two primary obstacles to success, which stem from their risk-averse mindset and insufficient leadership and soft skills and limited access to human and financial resources. Women face obstacles to independence and goal achievement because of cultural norms and social expectations that restrict their development.

Therefore, to enable women to overcome obstacles and realize their full potential, there is the need to change perceptions and question ingrained limitations and cultural notions of gender and power. As identified by Sangolagi and Alagawadi (2016), women's entrepreneurship and economic empowerment are becoming more popular. Women entrepreneurs have particular obstacles that prevent them from reaching their full potential, even though they go through a similar entrepreneurial process to men. Recent trends indicate that an increasing number of women are pursuing successful careers as entrepreneurs, thanks in part to more financial opportunities, improved economic conditions, and increased work experience and education. Obstacles encompass restricted financial resources, prejudice against women, and insufficient engagement with prosperous business owners. As more women leave behind traditional roles to pursue careers in engineering and energy, development must support them. These women are driven by the desire to improve their communities, earn a living, give their children a top-notch education, create jobs, empower other women, and lower unemployment and economic inequality.

To support women's entrepreneurship and economic empowerment, it is imperative to address these issues and advocate for societal change, educational opportunities, and empowerment. However, Noor et al. (2021) state that the potential of women's entrepreneurship to advance national development and empower women economically is becoming increasingly acknowledged. Underemployment is thought to be addressed, and economic growth is thought to be accelerated by the rise of female entrepreneurs in both developed and developing nations. Therefore, elevating women's status via business has the capacity to enhance general prosperity and the standard of living. However, there are obstacles to women becoming entrepreneurs, including low levels of education, tight budgets, prejudice based on gender, and a dearth of business education. Despite these challenges, it is generally accepted that the advancement of society depends on women's economic and entrepreneurial empowerment.

**Women empowering SMEs: their impact and growth.** Women entrepreneurs in small and medium-sized enterprises (SMEs) play a crucial role in the development of local economies (Anggadwita & Indarti, 2025). The involvement of women in business activities generates income while simultaneously empowering them to create social change. Women's entrepreneurship development serves as a fundamental approach to achieving women's empowerment in developing nations. Home-based and village-based entrepreneurship programs function as essential tools to boost women's involvement while raising their social position. The government, along with donor agencies, NGOs, and business community stakeholders, has created multiple interventions to increase women's participation across various sectors (Khatun and Kabir, (2014)).

SMEs, together with entrepreneurship, serve as essential drivers for worldwide economic development and technological advancement. The growing concern of women business founders stems from their significant impact on SMEs and national welfare. The growing research about the challenges that women entrepreneurs encountered in the Middle East region is not well studied. The performance of women entrepreneurs in SMEs depends heavily on sociocultural, political, and economic conditions, which are essential to understanding their achievements and obstacles. Through Tamkeen initiatives, the Bahraini government backs women's entrepreneurial development by concentrating on capability development and empowerment. Women entrepreneurs need cultural values, financial access, family responsibilities, and societal stereotypes to achieve growth and empowerment. The economic growth and employment opportunities will increase when adequate support is provided to address these challenges, which leads to more women entrepreneurs participating in SMEs (Hasan and Almubarak, 2016).

The economic participation of women through SMEs, according to Al-Mamary and Abubakar (2023), leads to both economic independence and social and economic development. The Saudi Arabian government expects women to become successful business owners who will actively participate in the economy despite facing structural and cultural barriers, including gender inequality and societal expectations (Aljarodi et al., 2024; Assaf, 2024). The authors Macías-Prada et al. (2024) and Mehtap et al. (2017) emphasized that social justice, economic growth, and innovation require entrepreneurial education and training that meet the needs of women and other underrepresented groups. Women should receive educational opportunities combined with entrepreneurship fundamentals to transform their creative ideas into thriving businesses. These programs also seek to foster the development of important "soft skills," including flexibility and

communication, to aid participants in navigating the ever-changing world of entrepreneurship (Zadorina et al., 2023).

Dushkova and Ivlieva (2024) express the opinion that this inclusive strategy has had a good knock-on impact on communities, fostering job creation, empowerment, self-reliance, socio-economic progress, and long-term sustainability in addition to helping individuals level their playing field. Alraddadi et al. (2024) and Al-Mamary and Abubakar (2023) also mention that providing varied educational options encourages women in Saudi Arabia to follow their dreams of becoming entrepreneurs by releasing latent potential and moving society closer to a more inclusive and entrepreneurial future.

Bayisenge et al. (2020) claim that encouraging women to work in small and medium-sized businesses is crucial for the growth of the economy. Its involvement in this industry helps foster expansion and the production of jobs, which lowers unemployment rates and increases economic prosperity. Its existence also broadens the business field's diversity, which boosts innovation and competitiveness (Ali, 2018). Women's empowerment facilitates gender equality and representation in leadership roles (Pant and Farrell, 2007; Thelma and Ngulube, 2024). Such empowerment enhances their standard of living and increases their financial freedom. Women's businesses frequently work to adopt sustainable practices and have a positive impact on society and the environment as a result of the growing interest in sustainability. All things considered, attaining sustainable development and fostering economic prosperity depend greatly on the empowerment of women in business.

**Factors affecting women's SME growth in Saudi Arabia.** The role of women in business, particularly in Saudi Arabia, is widely acknowledged for their contributions to job creation and community development. However, women entrepreneurs encounter various challenges rooted in social, political, economic, and familial factors that impede their business start-up and growth. The significant challenges facing Saudi women entrepreneurs include social and economic constraints, discrimination, and infrastructure challenges. Women face significant barriers in starting their businesses because of family restrictions. Saudi society needs women's business empowerment to reach economic and social development through the transformation of traditional concepts and the creation of an environment that supports women's entrepreneurial empowerment (Al-Ghamri, 2016).

Zamheri Ahmad (2011) states that the academic literature on women's entrepreneurial behavior and business activity in the Kingdom of Saudi Arabia (KSA) is limited and often controversial. Cultural influences, based on Islamic principles, affect women's participation in the labor force and create specific barriers such as social and familial control, economic dependence, and mobility restrictions. Academic research fails to adequately represent the increasing number of Saudi women who start businesses. The research investigates Saudi women entrepreneurs through business success evaluation and challenge assessment and economic engagement analysis in a society that limits female participation. The cultural context of Islamic values and societal structures determines how women in the KSA experience entrepreneurship. The research provides significant findings about women's entrepreneurship and contributes to the discussion about gender and economic outcomes in Islamic societies.

Welsh et al. (2014) observed a significant increase in the participation of Saudi women in the workforce, especially in the public sector. However, challenges such as unemployment and gender issues still exist. Many women show ambition, optimism, and determination to overcome challenges in different sectors. The major issues faced by Saudi women entrepreneurs are

ambiguous policies, gender-related obstacles, and bureaucratic hurdles. These women, despite the challenges of starting their businesses, show confidence, determination, and goal orientation, which indicates a high need for achievement.

The growth of women-led small and medium enterprises in the Kingdom of Saudi Arabia is influenced by several factors. To support these initiatives, a well-developed and reliable infrastructure, including sophisticated logistics infrastructure and cutting-edge communications technology, is crucial. The development of these projects, along with their future growth, depends heavily on funding acquisition capabilities. The establishment of supportive legislation together with regulations creates an environment that encourages entrepreneurship while lowering obstacles (Alreshoodi et al., 2022; Al-Mamary and Abubakar, 2023).

Training and skill development enable women to become successful entrepreneurs and business owners who can effectively manage their enterprises and grow their businesses. Ongoing support is necessary to help women seize entrepreneurship opportunities. Resolving social and cultural issues is essential, as societal norms and expectations can hinder the advancement of these initiatives. A suitable legal framework and government backing are crucial for their empowerment. Entrepreneurs must adopt sustainable strategies that consider the environmental impact of their operations to address environmental and climate concerns, increase competitiveness, and enhance operational efficiency through technology and innovation.

Kyrgidou and Petridou (2013) go on to state that the creation of supportive networks, technical training, and coaching significantly increases the likelihood of empowerment. Gupta et al. (2024) maintain that without focusing on exports and international markets, growth may not be achievable, creating new opportunities for these initiatives to expand. Successful distribution and marketing plans are essential for empowerment. Finally, adequate funding and investment are needed to sustain the expansion of these enterprises.

### Hypothesis development

*Psychological factors.* The psychological factor is recognized as the most important predictor of entrepreneurial intentions in entrepreneurship research. It surpasses other factors in its influence on whether individuals choose to become entrepreneurs. Key aspects of this factor include a willingness to take serious risks, finding the idea of starting a business appealing, feeling comfortable with the prospect of entrepreneurship, and being enthusiastic about starting a business. These components collectively explain why some individuals are more inclined to pursue entrepreneurship as a career (Appolloni and Gaddam, 2009).

The psychological aspect of entrepreneurship plays a major role in determining how a person becomes an entrepreneur and how empowered they will be in the future. This study also highlights several motivations and personality traits that encourage people to become entrepreneurs and also the importance of intention as a prerequisite for entrepreneurial activity. This dimension includes a number of elements that are interrelated and affect a person's ability to be successful as an entrepreneur. The research in this field aims to identify the psychological characteristics that link to entrepreneurial empowerment through an analysis of these correlations to understand what makes successful entrepreneurs different from non-entrepreneurs while building frameworks for future studies of entrepreneurial behavior and performance (Chatterjee and Das, 2015).

Turkina and Thai (2015) state that because they are interested in understanding the effects of psychological factors on the

entrepreneurial process, the study of psychological dimensions in entrepreneurship is important. Entrepreneurship is a social phenomenon that begins with the identification of opportunities, involves the interaction with people, and ends with the creation of companies with specific corporate cultures. The outside environment view of an entrepreneur, as explained by self-efficacy, the entrepreneurial event model, and the theory of planned behavior, determines their decision to start a new business. These ideas state that psychological background is crucial in explaining entrepreneurial motivation, which is determined by two factors: the desirability of entrepreneurship and the beliefs about one's ability to manage entrepreneurial behavior. Sociopsychological factors, including cultural values and social norms, together with cognition-based social axioms, strongly affect people's opinions regarding entrepreneurship, desirability, and viability. This comprehensive approach delivers an extensive framework for studying entrepreneurial activity in different social environments.

The definition of business inclination heavily relies on psychological factors. Entrepreneurs typically display three essential psychological traits, which include risk-taking ability, self-assurance, and locus of control and uncertainty tolerance. Entrepreneurs distinguish themselves from others through their willingness to take risks. Entrepreneurs take strategic risks, which differentiates them from managers according to this quality. People who believe in themselves achieve success because successful businesspeople trust their abilities to achieve success. People who have high self-confidence levels tend to start their businesses and that makes them have an internal locus of control because they believe they can lead their life path and direct their activities. The capacity to deal with ambiguous and uncertain circumstances is referred to as tolerance for ambiguity. Entrepreneurs are usually high on ambiguity tolerance since they often encounter uncertain and difficult situations in their business endeavors. These psychological traits, which are favorable to entrepreneurial orientation and important in encouraging entrepreneurial behavior and empowerment, include risk-taking, self-efficacy, internal locus of control, and tolerance for ambiguity (Javed et al., 2018).

Santos et al. (2017) state that in the past, research on entrepreneurship has mainly focused on male entrepreneurs and has identified psychological characteristics such as risk propensity, autonomy desire, and opportunity identification as predictors of entrepreneurial activity. However, in the middle of the 1970s, the importance of gender-specific psychological profiles became evident, and this led to an explosion of research on female entrepreneurs. Current studies, regardless of gender, stress the significance of examining both psychological and cognitive characteristics as essential factors that affect entrepreneurial empowerment, the understanding of entrepreneurship centers on entrepreneurial cognition, defined as the knowledge frameworks that guide evaluations and choices related to possibilities and venture creation. While the majority of related research has not shown differences between genders, some studies have suggested possible variations in psychological and cognitive aspects. The focus of current profiling approaches is on cognitive models, which highlight the relevance of individual cognitive processes in complex entrepreneurial decision-making. These models center on attitudes and beliefs as determinants of entrepreneurial intentions and behaviors.

A key component of enabling women to become entrepreneurs is psychological factors, which include self-assurance, perseverance, optimism, stability, adaptability, self-motivation, relationship-building, communication skills development, and the fear of failing. Together with the psychological and social support that fortifies women's resolve and endurance, these elements allow women to be driven and pursue their entrepreneurial endeavors.

These elements work together to provide women with the tools they need to develop their ideas and succeed as entrepreneurs, promoting social and economic advancement.

Based on the comprehensive discussion above, the following hypothesis is posited:

*H1. There is a significant positive relationship between psychological factors and women's empowerment in achieving entrepreneurial empowerment.*

*Market conditions.* Understanding market conditions and their impact on entrepreneurial empowerment involves recognizing different levels of market responses: awareness, flexibility, and direct-action strategies. Direct action strategies are the most proactive and involve significant risk due to market uncertainties. Entrepreneurs' decisions to engage in these strategies are influenced by their firm's competencies and past performance. A firm with strong competencies and a history of good performance is more likely to take bold action to seize market opportunities. Conversely, poor performance can also drive firms to make strategic changes in an attempt to improve. Overall, a firm's ability to respond effectively to market conditions is crucial for empowering entrepreneurs to make informed, strategic decisions for growth and empowerment (Mullins, 1996).

The concepts of marketing and entrepreneurship are combined in market-driven entrepreneurship, with a focus on spotting market possibilities and offering cutting-edge goods and services. Different forms of entrepreneurship, including opportunity-based and inventive entrepreneurship as well as corporate entrepreneurship, are influenced by fundamental institutional conditions and market efficiency. While it positively affects innovative entrepreneurship, the fundamental institutional and market architecture has little effect on opportunity-based entrepreneurship. Strong innovation-friendly environments, however, have a negative impact on both types of entrepreneurs because corporate entrepreneurship prospers in every environment. While corporate entrepreneurship may supplant market-driven entrepreneurial activity in circumstances that support innovation, better institutional and market contexts can encourage innovative entrepreneurship. There is a definite relationship between the state of the market and entrepreneurial activities (Ali et al., 2020).

According to Sato et al. (2012), the size of the market and entrepreneurship are related. Both the decision of prospective entrepreneurs to launch new firms and corporate earnings are impacted, both positively and negatively, by the growth of the local market. Negative effects come from competition and diseconomies of congestion, but positive effects come from the technological and financial externalities of market expansion and economies of density. Depending on the stage of entrepreneurship, market size has varying effects.

The state of the market is crucial in enabling women to succeed as entrepreneurs. The leading woman needs to take advantage of these situations as the market is developing quickly. She should be aware of these conditions. For instance, women have more options to pursue their entrepreneurial endeavors thanks to the shift toward a knowledge and technology economy, and the domains of innovation and technology present excellent prospects. Furthermore, shifting consumer demands and habits create new opportunities for offering cutting-edge goods and services that cater to individual preferences. Such an environment provides pioneering women with the chance to successfully address their needs. The market is seeing a rise in support and funding for women's projects due to growing awareness of gender equality and the significance of promoting women's participation in the economy. These circumstances support women's entrepreneurship, but they also necessitate the growth of leadership abilities, as well as the

capacity for creativity and constant market adaptation, to guarantee business empowerment.

Based on the comprehensive discussion above, the following hypothesis is posited:

*H2. There is a significant positive relationship between market conditions and women's empowerment in achieving entrepreneurial empowerment.*

**Economic factors.** Entrepreneurship, driven by various economic factors, plays an indispensable role in fostering job creation, innovation, and overall economic growth. SMEs have emerged as critical contributors to employment and GDP in numerous regions across the globe. Governments are instrumental in creating a conducive environment for entrepreneurship through the implementation of supportive policies, fiscal incentives, and the development of essential infrastructure. The entrepreneurial ecosystem depends on knowledge spillovers, competition, and diversity among enterprises, which in turn leads to sustained economic development. Successful entrepreneurship requires a balance between market opportunities, access to capital, entrepreneurial education, and a favorable regulatory framework, which all contribute to sustainable economic prosperity and societal well-being (Toma et al., 2014).

Studies examining economic factors and their effects on entrepreneurship demonstrate the importance of identifying growth drivers, especially during economic downturns, to fight unemployment. Besides the traditional factors of investment and public spending, entrepreneurship is being recognized increasingly for its contribution to economic growth and employment. These factors can be social, cultural, or economic in nature and include government policies, economic performance, innovation, and openness. General government spending in many different organizations functions as an entrepreneur stimulant by fixing market failures and offering necessary support, yet it sustains ventures that do not generate productivity. Economic stability and basic performance, which normally stem from the low interest rate and favorable tax regimes, act as a major driver that encourages entrepreneurial activities. While in the same vein, innovation has remained a very important and relevant component because it not only prompts entrepreneurs to initiate new ventures but also fosters a continuous cycle of innovation. The openness to foreign investment and trade has significantly increased entrepreneurship by encouraging an export-oriented approach. The complete understanding of these economic factors is essential for entrepreneur empowerment and sustainable economic development promotion (Castano et al., 2015).

The economic factors are also considered to have a significant role in both reducing the effects of economic downturn and employment rates and in entrepreneurship and economic development. Therefore, in order to boost economic activity and to give total support to entrepreneurs, it is essential to have appropriate economic openness and performance. The economic variables and their interactions demonstrated a substantial relationship which impacts both economic expansion and business start-up rate. The correlation between these variables gives the policymakers the essential information to develop policies which promote entrepreneurship while reducing the negative economic impacts (Castano et al., 2015).

According to Al-Mamary and Abubakar (2023), economic factors consist of both internal and external elements which affect business profitability and empowerment. Women entrepreneurs encounter significant challenges to secure business recognition and funding for expansion, particularly in developing countries such as Pakistan. The research demonstrates that women working across various sectors encounter vital elements which consist of social aspects together with political and financial components.

SMEs operating under challenging political and economic conditions experience significant impacts on their business performance because they must navigate complex regulatory systems with restricted financial capabilities. The wide range of obstacles forces businesses to consider political and economic elements when establishing their results.

The fundamental requirement for women entrepreneurs to achieve success depends on economic empowerment. The process needs to provide female entrepreneurs with various funding choices, which they require to start and expand their businesses. Legal systems need to create support for individual property rights that include all people, and intellectual property requires dedicated attention. A female entrepreneur who understands market dynamics and customer needs can successfully identify business opportunities while fulfilling market demands. The expansion of operations across international borders enables businesses to increase their influence and profitability while achieving greater scalability. Women play a vital role in sustainable development through their support of local businesses and their active involvement in community economic activities. Business sustainability depends on financial management education because it leads to higher profitability and entrepreneurial empowerment.

Based on the comprehensive discussion above, the following hypothesis is posited:

*H3. There is a significant positive relationship between economic factors and women's empowerment in achieving entrepreneurial empowerment.*

**Socio-cultural factors.** The sociocultural business environment plays a major role in shaping entrepreneurial intentions and behaviors by creating a social framework that influences individuals' mindsets and actions. This environment includes shared values, social systems, and cultural norms that collectively impact people's behaviors and ways of life. It is important to study the sociocultural business environment because personality traits alone do not fully predict entrepreneurial behavior. The process of socialization through education, religion, and family background creates entrepreneurs by shaping individuals into business founders. The combination of sociocultural factors with entrepreneurial tendencies results in new venture creation, which demonstrates the strong influence of social context on entrepreneurship (Abdullahi and Zainol, 2016).

The environment and motivations that drive entrepreneurial activity receive significant influence from sociocultural factors, which serve as powerful tools for entrepreneur empowerment. A country's social environment, which includes its structural framework and developmental stage together with social value systems and institutional quality, determines whether it will facilitate or impede entrepreneurial activities. Market activities flourish through strong institutions, which simultaneously safeguard people from unexpected shocks in a supportive social environment. People's social conduct emerges from cultural standards, educational systems, and societal beliefs. The combination of high educational standards allows people to build business capabilities, while free societies with positive values create an environment that supports new business ventures. The quality of institutions, education, and societal norms are socio-cultural factors that are crucial in fostering a conducive environment for entrepreneurial activity, which in turn drives growth and job creation (Castaño et al., 2015).

The requirements of society, together with cultural elements, create specific obstacles for female business owners, according to Al-Mamary and Abubakar (2023). According to Abou-Moghli and Al-Abdallah (2019) and Zamberi Ahmad (2011), one of these challenges is adapting to Islamic social and cultural norms. The

sociocultural variables play a major role in determining the career choices of female entrepreneurs, which in turn affects the level of entrepreneurship in a particular place and at a particular time. Through their impact on social networks and access to resources and perception of possibilities, they also influence women entrepreneurs' productivity and empowerment. Family, life partners, religion, and other cultural factors are important determinants of decision-making and empowerment for women entrepreneurs in underdeveloped countries. These results support the theory that sociocultural elements affect female entrepreneurs.

The authors Castaño et al. (2015) state that economic growth and entrepreneurship development are affected by social factors. This study shows that the promotion of an environment conducive to entrepreneurship and economic growth can be achieved by promoting social values, education, economic independence, and high-quality institutions. Also important for the provision of prerequisites for a suitable social climate are the robust institutional foundations in the political, economic, and entrepreneurial environments. The cultural elements play a major role in influencing entrepreneurial activity according to research. The cultural validity of entrepreneurship, together with social values and education and training, represents essential components in this context. The analysis of social factors' interactions will produce results which policymakers can use to develop supportive policies for entrepreneurship while minimizing economic crisis impacts.

Noguera et al. (2013) state that female entrepreneurship is affected by social and cultural factors. The gender-specific dynamics of entrepreneurial activity require analysis of social and cultural factors. The factors that affect women's entrepreneurship include fear of failure, self-perceived skills, opportunity, and role models. The study shows that opportunities, competencies, and the availability of role models positively affect women's entrepreneurial aspirations, but fear of failure negatively affects their likelihood of becoming entrepreneurs. These elements are useful for the development of educational programs and supportive policies that will encourage women to become entrepreneurs. Social and cultural factors are particularly important in shaping entrepreneurial activity, and gender disparities are a key area of focus. Koe and Majid (2014) state that the development of sustainable entrepreneurship, which extends beyond profit-making to include social justice, environmental protection, and cultural preservation, is heavily influenced by sociocultural factors. Non-economic elements, such as sociocultural influences, have a large influence on sustainable entrepreneurship; these are the main drivers of this kind of activity rather than financial rewards. The way people view time, nature, and corporate social responsibility is shaped by cultural influences, as described by Trompenaars' seven dimensions of culture and Hofstede's cultural dimension model. The implementation of sustainable business practices is heavily influenced by social norms and peer pressure from coworkers, friends, family, business partners, and industry participants. In today's complex business environment, it is important to understand the sociocultural factors that can support sustainable entrepreneurship.

The research conducted by Moral et al. (2024) demonstrates that social and cultural elements determine the success of women who become business owners. The essential factor involves recognizing both the opportunities and challenges that women encounter in their social environment. The corporate sector needs a change in how society and culture view women's roles. Gupta et al. (2024) found that business success depends on both educating people about women's business value and granting them leadership positions and decision-making authority. Abd El Basset et al. (2024) also state that the social and cultural barriers

that prevent women from advancing in the corporate sector should also be eliminated, and women's confidence in their ability to empower themselves should be encouraged. This means that assessing societal norms and values to facilitate the achievement of entrepreneurial goals is crucial in enhancing gender balance in the entrepreneurship field and fostering innovation and diversity in ideas and initiatives through the promotion of diversity, empowerment, and opportunity for women entrepreneurs.

Based on the comprehensive discussion above, the following hypothesis is posited:

*H4. There is a significant positive relationship between socio-cultural factors and women's empowerment in achieving entrepreneurial empowerment.*

**Entrepreneurial orientation factor.** Entrepreneurial orientation (EO) is crucial for firms engaging in corporate entrepreneurship and encompasses practices that identify and launch new ventures. The Entrepreneurial Orientation (EO) describes the organizational mindset and culture through its five dimensions, which include innovativeness, proactiveness, risk-taking, competitive aggressiveness, and autonomy. The five dimensions of entrepreneurial orientation improve firm performance but operate independently to produce different effects on performance. The five components of entrepreneurial orientation (EO), which include innovativeness, proactiveness, risk-taking, autonomy, and competitive aggressiveness, play a vital role in determining both financial and non-financial firm performance (Koe, 2016). A balanced EO is necessary because excessive decentralization and aggressive competition can negatively affect performance (Dess and Lumpkin, 2005). EO has also been studied at the individual level as individual entrepreneurial orientation (IEO), which represents personal attitudes and behaviors. Research indicates that entrepreneurship education builds IEO, which leads to higher entrepreneurial intention and creativity and innovation. The development of entrepreneurial competencies in education should be emphasized to enhance entrepreneurial performance. The literature presents various variables that define entrepreneurial orientation, yet scholars disagree about their exact characteristics. A company shows innovativeness through its power to develop new concepts and experiment with unconventional methods to improve its products and services. Organizational autonomy refers to the internal personnel's freedom to create and implement entrepreneurial concepts that go beyond administrative boundaries.

A company demonstrates risk-taking behavior when it accepts challenges that demand substantial resource allocation. A business demonstrates proactiveness through its active pursuit of market opportunities while shaping its business environment in fast-moving marketplaces. The way a company responds to competitors and current competitive trends is known as competitive aggressiveness. Some businesses use a competitive approach to defeat their competitors in their industry. These factors, together with others, define an organization's entrepreneurial orientation, and their interrelation can significantly affect its performance and success in the market (Al-Mamary et al., 2020).

Al-Mamary and Alshallaqi (2022) define entrepreneurial orientation (EO) as a fundamental concept in corporate management that describes a company's ability to exhibit traditional entrepreneurial characteristics, including innovation, initiative, and risk-taking. The framework for understanding this concept was developed by numerous academics into Miller's original theory of EO. A business that fights to capture future market opportunities independently, innovates, takes prudent risks, and actively searches for chances is described by EO. The pursuit of entrepreneurship by a company depends on its strategy and EO.

A business has multiple aspects that are affected by EO, including its policies, its management attitudes, and key conduct.

Dess and Lumpkin (2005) defined the five fundamental dimensions of EO as autonomy, innovativeness, risk-taking, proactiveness, and competitive aggressiveness. These factors influence a company's strategic initiatives, decision-making procedures, and entrepreneurial behavior, which in turn affect the company's competitive advantage and performance.

Al-Mamary and Abubakar (2023) define innovativeness in the context of entrepreneurship as a company's propensity and ability to develop unique concepts, procedures, goods, and services through trial and error and the use of cutting-edge technologies. It emphasizes how crucial it is for a business to expand its product range and keep up with the latest developments in technology. To identify possibilities, spur growth, and have a good social impact—all of which contribute to economic and societal advancement—women entrepreneurs must embrace a creative attitude. Entrepreneurship requires risk-taking as a fundamental element because it means taking calculated chances, which drives business expansion and empowerment. Businesses need proactive planning and active market prospect searches to stay competitive while adapting to changing market conditions. Competitive aggressiveness describes how businesses use strategic competition to enter or expand into new markets.

Saudi Arabian women entrepreneurs need these characteristics to achieve success and empowerment and create substantial social and business impact. The topic of entrepreneurial orientation (EO) has received extensive scholarly attention and thorough examination. The study demonstrates the necessity of promoting entrepreneurial mindsets throughout society by aligning organizational goals with entrepreneurial principles.

The traditional view of EO linked it to innovation and risk-taking, but recent research shows that EO creates stronger organizational innovation and empowerment than its empowering function. The three dimensions of EO—risk-taking, proactiveness, and entrepreneurial ambition provide valuable insights about how small and medium-sized organizations make decisions that affect their strategic development and innovation and opportunity capture.

Women achieve entrepreneurial success through their entrepreneurially oriented approach. The entrepreneurially oriented aspect includes both a powerful belief in innovation value and a willingness to take risks and grasp new opportunities. Women who possess an entrepreneurial mindset transform their business ideas into successful commercial ventures. This approach promotes the growth of a creative problem-solving mindset and the pursuit of novel solutions. Additionally, it promotes confident investment in its ventures and takes financial risks. To support and encourage women to create their vision and realize their goals as entrepreneurs, as well as to educate and train them in entrepreneurial skills, this trend needs to be strengthened. As such, she possesses the capacity to shape the market, create novel goods and services, and establish prosperous ventures that bolster economic expansion and elevate the stature of women as influential figures in the corporate sector.

Based on the comprehensive discussion above, the following hypothesis is posited:

*H5. There is a significant positive relationship between the entrepreneurial orientation factor and women's empowerment in achieving entrepreneurial empowerment.*

**Education and skill factors.** Entrepreneurial education involves educating students to develop the skills necessary to start their own businesses, enhancing their entrepreneurial capabilities and perceptions. It includes courses and practical experiences that foster entrepreneurial intentions. Despite efforts to boost student

creativity and innovation, many universities lack comprehensive educational offerings in entrepreneurship. While some institutions have entrepreneurship centers, there are often no dedicated departments or undergraduate degrees in the field. Entrepreneurial education at earlier stages, such as in schools, is minimal, with most entrepreneurial knowledge being self-taught postgraduation.

Although entrepreneurial education is deemed adequate in some contexts, further efforts are needed to enhance its implementation (Kayed et al., 2022). Higher education entrepreneurial education has advanced because of increasing student interest in entrepreneurship programs. These programs promote new venture development, while research shows they lead to the creation of new businesses. Research has concentrated on teaching entrepreneurship methods through experiential learning and problem-based learning approaches. The current research identifies a knowledge gap regarding effective teaching methods for entrepreneurship education. Traditional teaching methods fail to meet the needs of students because they lack the dynamic, real-world, experience-based approaches that Rodríguez-López and Souto (2019) advocate for.

Abdullahi and Zainol (2016) state that education provides people with the knowledge, skills, and talents needed for successful business and thus promotes entrepreneurship. The importance of education in entrepreneurship has been highlighted by recent studies, which show that education not only enhances personal development but also increases awareness and knowledge. Since educated people are better at spotting and seizing business opportunities, higher levels of education are linked to a stronger propensity for entrepreneurship. The development of management skills together with communication abilities and creativity and flexibility skills through education enables entrepreneurs to take strategic risks. Research findings demonstrate a positive relationship between educational attainment and entrepreneurial aspirations. According to Rosique-Blasco et al. (2016), entrepreneurship education develops two essential skill sets, which include business management competencies and creative opportunity identification capabilities. The first set of focuses for business operation can be taught, but the second set focuses on developing creative thinking and proactive behavior. Vakili et al. (2016) demonstrate that educational programs teach entrepreneurship skills, which provide students with both knowledge and skills and an entrepreneurial mindset for business success. The educational approach to entrepreneurship focuses on developing creativity alongside innovation and practical business skills. The program aims to help people create business ideas and find opportunities and overcome the challenges of starting and operating businesses.

The educational system helps students develop essential abilities, including planning, self-management, teamwork, communication, and problem-solving. The following educational strategies help students learn effectively: teaching students how to learn and promoting cooperative learning and decision-making frameworks and real-world experiences and knowledge transfer and reconstruction and thinking systems for systematic problem-solving. The research by Khoury et al. (2012) shows that entrepreneurship education now focuses on preparing people to start businesses by teaching them analytical, social, leadership, and innovative skills for empowerment. It emphasizes the ability to make decisions with limited information and recognizes the importance of systematic and intentional innovation. The three essential talents for entrepreneurship consist of technical business management skills and personal entrepreneurial abilities, which include risk-taking, technical management, and communication. People need to learn about entrepreneurship because it teaches them to

detect opportunities and capture them while developing these capabilities.

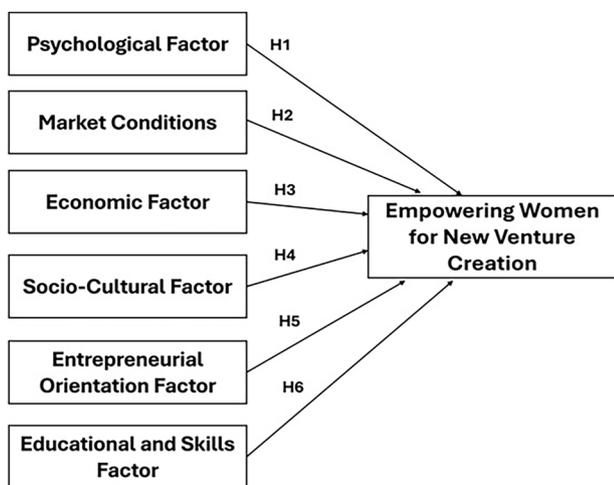
Women need education and skill development to achieve success in business ownership. Through education, women gain the necessary knowledge to handle labor market obstacles, learn about business economics, and develop innovative ideas. The fundamental entrepreneurial abilities of financial management, marketing and business development emerge from education, which enables women to successfully establish and execute their business concepts. The empowerment of women entrepreneurs requires both social backing and financial assistance. Women need protection from violence and prejudice together with equal educational and training opportunities. Governments, together with communities, support female entrepreneurship through legislative backing and dedicated funding initiatives for women business owners. Women who apply their educational knowledge and professional abilities can build successful businesses that lead them to commercial market entry. Such activities promote gender equality and sustainable development through economic growth and job creation.

Based on the comprehensive discussion above, the following hypothesis is posited:

*H6. There is a significant positive relationship between education and skills and women’s empowerment in achieving entrepreneurial empowerment.*

**Methodology**

**Conceptual framework.** The conceptual model outlines key factors influencing women’s empowerment in achieving entrepreneurial empowerment, focusing on six primary dimensions: psychological, market, economic, sociocultural, entrepreneurial, and education and skills. Psychological factors include risk-taking, self-confidence, locus of control, and tolerance for ambiguity, which are crucial for entrepreneurial motivation. Market conditions present a chance for businesses to capitalize on changes that occur quickly in the economic environment. The economic factors demonstrate why businesses need capital and supportive policies. Sociocultural elements highlight how societal norms and values affect women’s entrepreneurial activities. The entrepreneurial orientation consists of five dimensions (see Fig. 1), which include autonomy, innovativeness, risk-taking, proactiveness, and competitive aggressiveness. Education and skills development serve as the essential factors because they provide the necessary knowledge and competencies required for successful entrepreneurship. The study hypothesizes that each dimension will create



**Fig. 1** The study model.

a substantial positive connection with women’s empowerment in their entrepreneurial activities.

**Research design.** This study used a quantitative research design to analyse the interrelationship that exists among the postulated variables influencing the women’s empowerment in entrepreneurship. It utilizes the Partial Least Squares Structural Equation Modelling (PLS-SEM) via the SmartPLS V.4.1.0.0 in order to examine the postulated conceptual model with multiple variables, making it ideal for exploratory social science research (Hair et al., 2017). The PLS-SEM is particularly valuable as it handles the non-parametric data and enables the simultaneous analysis of measurement and structural models (Vaithilingam et al., 2024).

This research design is effective for studying correlational variables impacting women’s entrepreneurial success. It also allows for the exploration of direct and indirect effects that contribute to the validity and reliability of the search findings (Hair et al., 2017). Thus, the research design provides a comprehensive framework for advancing an understanding of women’s empowerment in dynamic contexts.

**Population and sampling.** This study targeted women entrepreneurs in Saudi Arabia, where female business leadership has significantly expanded since 2024 (El-Shaeri, 2024). Using the snowballing sampling techniques, the research collected data from 311 completed questionnaires, meeting the sample size criteria for structural equation modeling (Kline, 2023). The study’s main focus is on women in Saudi Arabia as the main unit of analysis, with items tailored to assess the influence of psychological, market, economic, sociocultural, entrepreneurial orientation, educational, and skills factors in Saudi Arabian women’s empowerment in starting a new business.

The study chose snowballing techniques in order to enhance external validity and ensure diverse representation; while leveraging existing networks, the researchers were able to reach participants from varied sociocultural backgrounds, reducing sampling bias and expanding participant diversity (Sadler et al., 2010). This approach provided rich insights into the main of women’s entrepreneurship across Saudi Arabia, as well as strengthening the study’s relevance and practical application.

**Sample size and selection.** As suggested by Kline (2023), an appropriate sample size for structural equation modelling should be between the sample sizes of 200 and 400 respondents. Taking into account an effect size of medium magnitude (0.05), an alpha level of 0.05, a power of 0.8, and six independent factors in addition to one dependent variable, the research concluded that a minimum of 300 respondents would be required to detect the effects that were anticipated.

The researchers used WhatsApp groups as online platforms to distribute survey questions because of the challenges in data collection in this context. The researchers used online platforms like WhatsApp groups to get the required number of responses for this study.

The researchers selected women entrepreneurs in Saudi Arabia by using WhatsApp groups that they accessed through local business associations and women’s networks to guarantee a diverse sample of women from retail, services, technology, and manufacturing sectors. The study participants had to meet two conditions: they needed to be women entrepreneurs who were both active in their business ventures and lived in Saudi Arabia. The study used a structured questionnaire of 31 questions with a five-point Likert scale to assess attitudes and perceptions toward women’s empowerment in entrepreneurship. This holistic approach allowed the researchers to capture the diverse

experiences of women entrepreneurs and the factors that affect their empowerment in Saudi Arabia.

**Data collection.** The research team received 324 completed questionnaires, which required all questions to be answered before submission. The authors actively dealt with the straight-lining responses that were found in 13 successfully completed questionnaires. Straight-lining describes a situation where participants consistently choose the same response for numerous questions without any variation. The removal of thirteen items from the dataset led to a total of 311 completed responses.

The researchers ensured discriminant validity to maintain the uniqueness of each construct related to women's empowerment in entrepreneurship. Finding no significant overlap between constructs, they retained all items and systematically selected 31 to represent the diverse experiences of Saudi Arabian women entrepreneurs.

**Measurement items.** The study relied on the participant opinions, measured using the five-point Likert Scale ranging from "Strongly Disagree" (1) to "Strongly Agree" (5). This scale helped identify the patterns in which the respondent responded and is widely recognized in social science for effectively measuring levels of agreement (Rokeman, 2024).

The survey instrument is utilize from a previous research instrument, ensuring that they were well aligned with the study objectives. Similarly, to ensure accuracy and reliability, multiple item purification steps were taken. The items were carefully selected from a credible source and modified slightly to suit the Saudi Arabian context, particularly for women-owned SMEs. Although some of the terminologies were slightly adjusted, the core concepts remain consistent so as to maintain the validity of the measurement tools. This systematic approach was basically designed to improve the reliability of the findings by ensuring the accuracy of the measurement tools used in this study.

### Data analysis and results

The research aims at systematically exploring the various factors that affect women's empowerment in entrepreneurship in Saudi Arabia, with a focus on psychological, market, economic, sociocultural, entrepreneurial orientation, and education and skills factors (ESF). Thus, the objectives of the study are well defined to ensure that data analysis is done in a systematic way to enable proper reporting of the results. The objectives function as directional principles to analyze data, which enables researchers to directly connect their findings to the particular empowerment elements under investigation. The detailed objectives improve result organization while enabling stakeholders to understand how individual factors enhance women entrepreneurs' empowerment, thus delivering practical recommendations for policymakers who want to establish supportive entrepreneurial conditions.

**Demographic profile.** The demographic data (Table 1) from the study provide a compelling picture of the current state of women entrepreneurs in Saudi Arabia, underscoring significant trends and their implications for both local and global economies.

Firstly, a striking 90.4% of the respondents are single women, while only 9.6% are married. This overwhelming predominance of single women can be interpreted on multiple levels. The cultural norms of Saudi Arabia traditionally restricted women from entrepreneurship through their expectations about marriage and family responsibilities. The high number of single respondents indicates a transformation in social attitudes and behaviors among young women who now show greater independence in

**Table 1 Demographic data.**

Items	Scale	Frequency	Percent
Status	Married	30	9.6
	Single	281	90.4
	Total	311	100
Age	Less Than 30	303	97.4
	31-40	8	2.6
	Total	311	100
Start new ventures	Interested	262	84.2
	Not Interested	49	15.8
	Total	311	100

their career choices. The demographic pattern shows particular importance because 97.4% of participants fall under the age of 30, which demonstrates the energetic and ambitious nature of this age group. The data indicates a societal trend because 97.4% of participants are under 30 years old, which reflects the youth-driven nature of this group. In many societies, including Saudi Arabia, younger generations tend to challenge traditional gender roles (Al Chami and Youssef, 2025; Al-Bakr et al., 2017), and this data shows such a trend.

The survey results show that 84.2% of these women want to start their own businesses, which indicates a strong entrepreneurial spirit among young people. The enthusiasm of these women is essential because it aligns with Saudi Arabia's Vision 2030 (Kosárová, 2020; Khan, 2016), which seeks to diversify the economy and increase female workforce participation for sustainable development. The World Bank reports that women's rising participation in the workforce will boost GDP growth, according to Ullah et al. (2025), and women's increased participation in entrepreneurship will generate billions for global economies by 2025, according to Richard (2025) and Powell and Chang (2016).

The statistics demonstrated Saudi Arabian women's readiness to start businesses while showing that there exists untapped potential for innovation and socioeconomic growth. Young single women tend to embrace new technologies and innovative business models and modern business practices which leads to entrepreneurial ecosystem innovation. The interests of these women match government goals, which indicates a promising time for women's economic empowerment in Saudi Arabia.

Furthermore, it is pivotal to consider the educational background of the respondents, as access to education has dramatically improved for women in recent decades in Saudi Arabia. Female enrollment in higher education reached ~76% of girls registered in high school compared to 70% of boys in Saudi Arabia; women are the majority at the university level, with 37% of women achieving tertiary the level as opposed to 23% of men (Almutarie, 2025). However, this, has increased educational access, equips women with the necessary skills and knowledge to navigate the complexities of entrepreneurship successfully, fostering a new generation of informed and capable entrepreneurs.

The demographic data shows positive trends about women's participation in entrepreneurship throughout Saudi Arabia. The substantial number of young single women who want to establish their own businesses demonstrates both individual ambitions and a wider economic shift in the country. The women who challenge conventional norms while supporting economic diversification efforts will become essential for building the future entrepreneurial environment both in Saudi Arabia and worldwide as part of the global women's empowerment movement in business. The research findings indicate that women's entrepreneurship support represents a vital approach

**Table 2 Reliability and validity.**

S/n	Variables	Items	FL	CA	CR (rho_a)	CR (rho_c)	AVE
1	Psychological Factor	PF1	0.927	0.913	0.928	0.938	0.792
		PF2	0.869				
		PF3	0.913				
		PF4	0.848				
2	Market Conditions	MC1	0.841	0.788	0.793	0.876	0.703
		MC2	0.790				
		MC3	0.882				
3	Economic Factor	EF1	0.872	0.942	0.942	0.956	0.812
		EF2	0.901				
		EF3	0.937				
		EF4	0.911				
		EF5	0.883				
4	Socio-Cultural Factor	SCF1	0.943	0.913	0.926	0.939	0.793
		SCF2	0.852				
		SCF3	0.826				
		SCF4	0.936				
5	Entrepreneurial Orientation Factor	EOF1	0.804	0.950	0.953	0.959	0.746
		EOF2	0.897				
		EOF3	0.899				
		EOF4	0.913				
		EOF5	0.891				
		EOF6	0.703				
		EOF7	0.877				
		EOF8	0.907				
6	Education and Skills Factor	ESF1	0.853	0.840	0.843	0.903	0.757
		ESF2	0.886				
		ESF3	0.871				
7	Women's Empowerment	EWE1	0.915	0.944	0.944	0.957	0.816
		EWE2	0.913				
		EWE3	0.926				
		EWE4	0.868				
		EWE5	0.894				

\*\* Psychological factor (PF), market conditions (MC), economic factor (EF), sociocultural factor (SCF), entrepreneurial orientation factor (EOF), education and skills factor (ESF), and women's empowerment (EWE)\*\*

to achieving sustainable economic expansion and social advancement worldwide.

**Assessment of the measurement model**

*Construct validity.* The research included 31 items with the lowest factor loading value reaching 0.702843. The researchers Baharum et al. (2023) and Ferguson and Cox (1993) confirmed that this value exceeded the standard threshold of 0.5, so no items required removal because of low factor loading. The authors decided to keep all 31 items because their factor loadings ranged between 0.702843 and 0.942776, which are above the minimum threshold. The authors performed various tests to confirm both the reliability and validity of the construct. The research established measurement reliability and both convergent validity and discriminant validity to ensure measurement quality. The detailed results of these reliability and validity analyses appear in Table 2. The study used constructs that passed reliability and validity tests to establish a strong foundation for the research results.

*Convergent validity.* The researchers tested convergent validity by examining multiple metrics, which included cross-loadings together with Cronbach's alpha and average variance extracted (AVE) and composite reliability (CR) of the constructs (Al-Mamary, 2025a). The research team presented these evaluations in Table 2 and Fig. 2. All item loadings exceeded 0.40 to a significant degree with values ranging from 0.702843 to 0.942776. Cronbach's alpha evaluated internal consistency by determining

whether items in each construct showed reliable relationships with each other. The AVE indicates the proportion of variance that a construct explains beyond measurement error, while the CR evaluates the complete reliability of the construct.

The results indicated that all the items had strong convergent validity with high levels of internal consistency and reliability, thus validating the constructs used in the study as robust. Ang et al. (2024) stated that for factor loadings to be interpretable, they should be greater than 0.4. He also argued that all standardized factor loadings should be at least 0.5 and, preferably, 0.7 or higher (Al-Mamary, 2025b; Alshebami, 2024; AlSondosa and Salamehb, 2020; Zamil et al., 2020; Alshebami (2023)). This higher threshold means that the construct should explain at least 25% of the variance of each indicator, with a target of explaining 49% or more of the variance. The reliability and validity of measurements increase when stronger factor loadings exist because they better capture the variance in each indicator. The research constructs achieve robustness and meaningfulness through these strict factor loading criteria.

The CR values ranged from 0.788 to 0.950, which surpassed the minimum threshold of 0.70. The Cronbach's alpha for all the items was consistently above 0.70, which is in line with the internal consistency criteria proposed. The study results confirm that the research instruments demonstrate both reliability and consistency, which ensures the quality of measurement data. The thorough reliability assessment demonstrates that the data is reliable and strengthens the validity of the study's results.

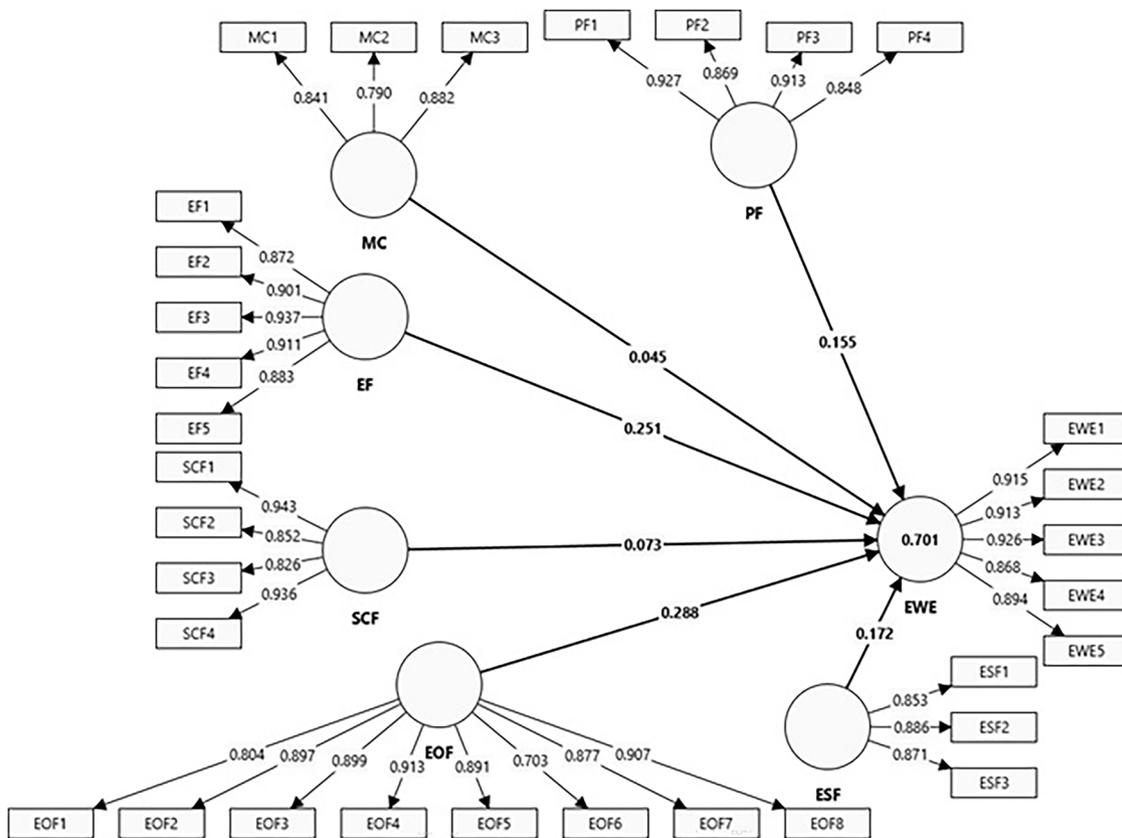


Fig. 2 The measurement Model.

Table 3 Discriminant validity (Fornell and Larcker).							
	PF	MC	EF	SCF	EOF	ESF	EWE
PF	<b>0.890</b>						
MC	0.590	<b>0.838</b>					
EF	0.563	0.590	<b>0.901</b>				
SCF	0.522	0.479	0.525	<b>0.891</b>			
EOF	0.664	0.702	0.682	0.567	<b>0.864</b>		
ESF	0.653	0.683	0.662	0.524	0.768	<b>0.870</b>	
EWE	0.666	0.640	0.715	0.562	0.769	0.731	<b>0.903</b>

\*\* Psychological factor (PF), market conditions (MC), economic factor (EF), sociocultural factor (SCF), entrepreneurial orientation factor (EOF), education and skills factor (ESF), and women's empowerment (EWE)\*\*  
 The square root of the AVE is represented by the diagonal values in bold

Table 4 Heterotrait-Monotrait (HTMT).						
	EF	EOF	ESF	EWE	MC	PF
EOF	0.720					
ESF	0.744	0.859				
EWE	0.758	0.812	0.819			
MC	0.685	0.812	0.838	0.742		
PF	0.594	0.704	0.735	0.708	0.688	
SCF	0.563	0.604	0.595	0.599	0.562	0.567

The HTMT inference test results indicated that a value of 1 exceeded the lower or upper confidence intervals as per Franke and Sarstedt (2019) (Franke and Sarstedt, 2019). The results also support the discriminant validity of the constructs, which further confirms that they are indeed distinct and not overlapping. This analysis enhances the credibility of the study's findings and ensures the robustness of the research methodology.

The research used convergent and discriminant validity tests to evaluate the constructs' validity. The average variance extracted (AVE) served as a measure to evaluate convergent validity by determining how well a construct explains the variance of its indicators. The recommended AVE score for constructs is at least 0.5, according to Ringle et al. (2020) and Sarstedt et al. (2021), which indicates that the construct should explain more than half of the variance of its indicators.

The minimum threshold for all constructs was met and exceeded with values between 0.703 and 0.816, as shown in Table 2. The high AVE scores indicate that the constructs are good at measuring the variance in their respective indicators, which supports their convergent validity. The high AVE values indicate that the constructs are reliable and robust, which enhances the overall quality and reliability of the research findings. The use of validity testing also highlights the rigour of the study's methodology and the reliability of its findings.

**Discriminant validity.** Basically, discriminant validity confirms the distinctness of the constructs within the path model (Cheung et al., 2023). It was evaluated using the Fornell-Larcker criterion and the heterotrait-monotrait (HTMT) ratio. The Fornell-Larcker criterion and the heterotrait-monotrait (HTMT) ratio results supported these findings, clearly indicating that the study constructs were both distinct and a reliable measurement tool.

Furthermore, discriminant validity requires that a construct share more variance with its indicators than with other constructs. This is satisfying when the average variance extracted (AVE) exceeds the square correlations with other variables. Thus, the result in Table 3 confirmed this condition for all constructs. These thorough assessments confirm the constructs' reliability, distinctness, and the validity of the overall research method.

The heterotrait-monotrait (HTMT) ratio served as the method to evaluate discriminant validity. According to Ab

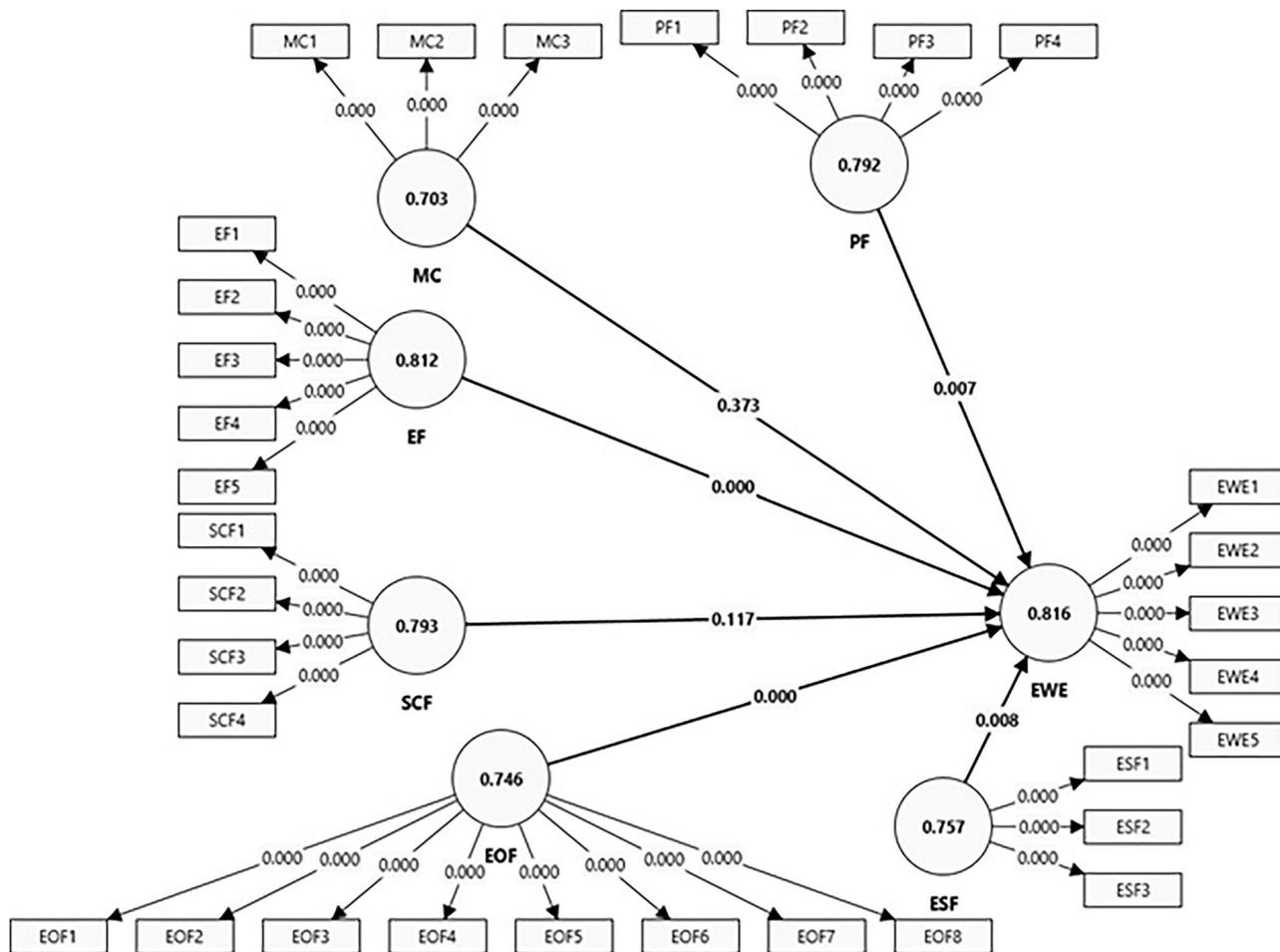


Fig. 3 Bootstrapping model.

Hamid et al. (2017), the threshold for HTMT values to establish discriminant validity should be less than 0.90. The results presented in Table 4 demonstrate that all HTMT values in this research study remain below the recommended threshold, thus establishing the distinct nature of the constructs. The results of this study provide additional evidence for the reliability and robustness of the measurement.

**Structural model.** The study used Crockett’s (2012) step-by-step procedure to assess the structural model, which included checks for collinearity, path coefficients, R<sup>2</sup> values, and effect sizes (f<sup>2</sup>). This approach examined the impact of psychological, market, economic, sociocultural, entrepreneurial orientation, education, and skills on women’s empowerment to start businesses in Saudi Arabia. These elements interact uniquely within the Saudi context, reflecting the region’s socio-economic and cultural dynamics. The model provided strong, evidence-based insights that support and explain women’s entrepreneurial empowerment.

The evaluation of the structural model requires first verifying that lateral collinearity does not exist. The variance inflation factors (VIFs) for independent constructs in this study were all below 5.0, which indicates no lateral collinearity existed in this study. This means that the relationships between the independent variables are not strongly influenced by correlations with each other, thus increasing the reliability of the structural model analysis. Since lateral collinearity is not a concern, the study can continue by examining the relationships between variables and making reasonable inferences about the factors that influence women’s empowerment in entrepreneurship.

The results of the analysis are presented in Fig. 3, which indicated that market conditions (MCs) and the sociocultural factor (SCF) do not affect women’s empowerment (EWE) in Saudi Arabia. Thus, hypotheses 2 and 4 were rejected Fig. 3.

In contrast, the psychological factor (PF), economic factor (EF), entrepreneurial orientation factor (EOF), and ESF were found to have strong influences on women’s empowerment (EWE), supporting hypotheses 1, 3, 5, and 6 (see Table 5).

Table 6 presents the R<sup>2</sup> results for the endogenous constructs, particularly women’s empowerment in entrepreneurship in Saudi Arabia. (Rath et al., 2009; Zhang et al., 2017) categorizes R<sup>2</sup> values of 0.75, 0.50, or 0.25 as strong, moderate, and weak, respectively. These R<sup>2</sup> values serve as indicators of the strength of the relationship between the predictor variables and the outcome variable. The interpretation of these values enables researchers to determine how well the predictor variables explain the outcome variable. The research provides essential information about Saudi women’s business empowerment and their entrepreneurial support needs in Saudi Arabia.

The R<sup>2</sup> value of 0.701 for sustainability in Table 6 shows that the exogenous constructs, the psychological factor (PF), economic factor (EF), ESF, and entrepreneurial orientation factor (EOF) explain 70.1% of the variance in sustainable human capital development in Saudi Arabia, which is robust explanatory power. The research hypotheses receive support from the overall regression model because it demonstrates an adjusted R-squared (R<sup>2</sup>) value of 69.5% for women’s empowerment. The statistics demonstrate the extent to which the predictor variables collectively explain women’s empowerment results. The model

**Table 5 Bootstrapping.**

Hypothesis	Relationship	Std. Beta	Std. Dev	t-values	p-values	Findings
H1	PF -> EWE	0.155	0.058	2.677	0.007	Supported
H2	MC -> EWE	0.045	0.051	0.892	0.373	Not Supported
H3	EF -> EWE	0.251	0.062	4.073	0.000	Supported
H4	SCF -> EWE	0.073	0.047	1.569	0.117	Not Supported
H5	EOF -> EWE	0.288	0.079	3.636	0.000	Supported
H6	ESF -> EWE	0.172	0.064	2.674	0.008	Supported

\*\*Psychological factor (PF), market conditions (MC), economic factor (EF), sociocultural factor (SCF), entrepreneurial orientation factor (EOF), education and skills factor (ESF), Empowerment Women's Entrepreneurship\*\*

**Table 6 Variance explained in the endogenous latent variable.**

Variable	R-square	R-square adjusted
EWE	0.701	0.695

\*\*Empowerment Women's Entrepreneurship (EWE)\*\*

**Table 7 Effect size.**

Hypothesis	Relationship	Values	Effect size
H1	PF-> EWE	0.038558	Small
H2	MC-> EWE	0.003037	No effect
H3	EF-> EWE	0.097411	Small
H4	SCF-> EWE	0.011021	No effect
H5	EOF-> EWE	0.082463	Small
H6	ESF-> EWE	0.032771	Small

\*\*Psychological factor (PF), market conditions (MC), economic factor (EF), sociocultural factor (SCF), entrepreneurial orientation factor (EOF), education and skills factor (ESF), Empowerment Women's Entrepreneurship\*\*

demonstrates a strong ability to explain sustainability complexities through its high adjusted R<sup>2</sup> value, which provides essential information to policymakers and stakeholders. The research results enable significant improvement of knowledge about sustainable practices in the studied context.

The effect size (f<sup>2</sup>) measure demonstrates substantial external influence on internal variables through its ability to account for different variances rather than common variation. Ab Hamid et al. (2017), Cheung et al. (2023), Crockett (2012) proposed a different way of categorizing effect sizes, which are small (d = 0.02), medium (d = 0.15), and large (d = 0.35). This approach has been widely accepted and is used most often.

The seven external factors' effects on the endogenous ESF construct appear in Table 7. The psychological factors (PF), market conditions (MC), economic factors (EF), sociocultural factors (SCF), and entrepreneurial orientation factors (EOF) variables had minimal impact sizes. The overall guidelines encounter challenges in reaching substantial effect sizes because the effect size depends on both framework characteristics and study area specifics.

**Discussion**

The psychological factor (PF) has a positive effect on the empowerment of women entrepreneurs in Saudi Arabia. The study found a significant positive relationship between psychological factors (PF) and women's empowerment (EWE) in agreement with the findings of Chatterjee and Das (2015), Li et al. (2018), Appolloni and Gaddam (2009), Sidek and

Zainol (2011), and Javed et al. (2018). Their research highlighted the importance of psychological factors such as self-efficacy and motivation in enhancing women's empowerment in Saudi Arabian entrepreneurship. The establishment of policies and programs that support women entrepreneurs' mental well-being and confidence stands as a clear necessity. The creation of an enabling environment by policymakers and stakeholders enables women to overcome barriers and achieve success in their entrepreneurial pursuits by addressing psychological factors. The initiatives play a vital role in promoting gender equality and economic growth through the development of female entrepreneurship potential in Saudi Arabia.

The market conditions (MCs) have a positive effect on the empowerment of women entrepreneurs in Saudi Arabia. These findings are inconsistent with those of studies by Ali et al. (2020) and Sato et al. (2012). The study findings clearly indicated that market conditions have no significant effect on women's empowerment within the Saudi Arabian context. Therefore, this rejection of the hypothesis means that other factors than market conditions are more influential towards enhancing women's empowerment in entrepreneurship in Saudi Arabia, which is in contrast with the findings of Ali et al. (2020). Hence, government needs to investigate multiple methods, which will help women entrepreneurs overcome their business challenges. The approach demands knowledge about how women's empowerment in entrepreneurship exists across various dimensions. The government needs to develop broad intervention programs, which will address resource availability alongside institutional challenges and social support systems. A complete strategy needs to be developed to build an environment, which supports women entrepreneurs in their success and drives major economic expansion for Saudi Arabia.

The economic factor (EF) has a positive effect on the empowerment of women entrepreneurs in Saudi Arabia. This study established a significant positive relationship between the economic factor (EF) and women's empowerment (EWE). Chatterjee and Das (2015) and Al-Mamary and Abubakar (2023) supported this finding by stating that improving economic opportunities, providing financial resources, and increasing financial literacy among women entrepreneurs can greatly enhance their empowerment in Saudi Arabia. The research shows why Saudi Arabia needs policies that support women-led businesses through inclusive economic frameworks and specialized financial assistance programs. The government should implement gender gap reduction initiatives and economic empowerment programs for women because they establish an equal entrepreneurial environment that benefits Saudi Arabia. The initiatives serve as essential tools to enable women entrepreneurs to reach their full potential while creating sustainable economic growth and social advancement throughout Saudi Arabia.

The sociocultural factor (SCF) has a positive effect on the empowerment of women entrepreneurs in Saudi Arabia. The

study found that the sociocultural factor (SCF) does not have a significant effect on women's empowerment (EWE) in Saudi Arabia. This is in contrast with the findings of Castaño et al. (2015) and Chatterjee and Das (2015) that cultural norms and societal attitudes are the main drivers of women's empowerment in Saudi Arabian entrepreneurship. Therefore, policymakers are advised to pay attention to other factors that are more influential in empowering women entrepreneurs. The environment for women's entrepreneurial activities can be improved by policymakers who examine alternative strategies and implement interventions that tackle essential matters, including education and training and support networks. The approach is vital for addressing the obstacles that hinder women's empowerment and building an inclusive and equitable entrepreneurial ecosystem in Saudi Arabia.

The entrepreneurial orientation factor (EOF) has a positive effect on the empowerment of women entrepreneurs in Saudi Arabia. The study established a significant positive relationship between the entrepreneurial orientation factor (EOF) and women's empowerment. This finding is in line with the findings of Al-Mamary and Al-Shallaqi (2022), Venter (2014), and Martens et al. (2018), who pointed out that promoting an entrepreneurial culture, encouraging innovation, and encouraging risk-taking among women entrepreneurs can enhance their empowerment in Saudi Arabia. Business advancement for women needs programs that build their entrepreneurial abilities and entrepreneurial thinking. Policymakers who develop these qualities through these initiatives will enable women entrepreneurs to overcome challenges while converting opportunities into growth and innovation. The complete strategy works to create gender equality while driving economic expansion and social progress throughout the region.

The ESF has a positive effect on the empowerment of women entrepreneurs in Saudi Arabia. The study has provided strong evidence for a positive correlation between the ESF and women's empowerment (EWE). These findings are in line with the conclusions reached by Abdullahi & Zainol (2016), Aly et al. (2021), Kurczewska et al. (2020), Khoury et al. (2012), and Boldureanu et al. (2020) who stressed the need to invest in education, training, and skill development programs for women entrepreneurs to improve their empowerment. The combination of high-quality education access with skill-building opportunities allows women to achieve success in their entrepreneurial pursuits. Through business empowerment skills development, policymakers enable women entrepreneurs to achieve their maximum potential while stimulating economic growth and societal development.

The study findings validate the essential role of psychological factors together with economic opportunities and education and skills development for women entrepreneurs in Saudi Arabia, as supported by previous research on entrepreneurial success. The study confirms the psychological factor effect, which aligns with Appolloni and Gaddam (2009) and Siba (2019) self-efficacy theory that shows how people's beliefs about their business capabilities drive their business persistence and effort. The research confirms Ajiva et al. (2024) finding that women need economic resources and market support to succeed in business. However, the low impact of sociocultural factors and market conditions on women's empowerment contradicts some of the assumptions in the literature, which often identify these factors as barriers but may be lessened by the growing availability of educational programs and psychological support systems that increase women's confidence and skills. The complex nature of these challenges demonstrates the necessity for specific interventions, which both overcome conventional obstacles while utilizing education and psychological support as tools for empowerment to build an inclusive entrepreneurial environment in Saudi Arabia.

The research model examined the connections between psychological factors (PF), market conditions (MC), economic factors (EF), sociocultural factors (SCF), entrepreneurial orientation factor (EOF), and ESF. The research findings indicated that market conditions (MCs) and the sociocultural factor (SCF) failed to produce a significant impact on women's empowerment (EWE) in Saudi Arabia. The null hypotheses were accepted, which indicates that Saudi Arabia needs to focus on other factors that will enable women to participate in entrepreneurship. The implementation of Vision 2030's economic diversification and social development objectives requires policymakers to focus on interventions which address the identified influential factors to support women entrepreneurs effectively. The analysis of the hypotheses in this study provides valuable insights into the factors influencing women's empowerment in entrepreneurship in Saudi Arabia. The evaluation of each factor allows policymakers to develop targeted support strategies, which effectively boost women's empowerment. Research expansion with stakeholder participation will enhance interventions to build a supportive environment for women in business, which will help Saudi Arabia achieve its economic and social development targets (Kosárová, 2020; Khan, 2016).

### Implications

The research results have provided essential knowledge about how the psychological factors, together with market factors, economic factors, sociocultural factors, entrepreneurial orientation, and education and skills, influence women's empowerment in Saudi Arabian entrepreneurship. The research findings will assist policymakers in creating an appropriate policy, which will address the basic factors that influence women's empowerment in entrepreneurship through enhancing psychological support and economic opportunities and entrepreneurial skills development.

Organizations and institutions need to develop particular programs and initiatives for women entrepreneurs, which target the identified influential factors, including psychological well-being, economic empowerment, and entrepreneurial mindset. The study's findings about ESF as positive influences can be supported by investing in education and skills development programs for women entrepreneurs.

The research demonstrates the necessity to improve gender equality in entrepreneurship through addressing factors that limit women's empowerment for developing an inclusive business environment in Saudi Arabia. The study findings will enable stakeholders in the entrepreneurial ecosystem to develop targeted support systems and resources for women entrepreneurs, which will foster their growth and empowerment. The approach aligns with national development goals, including Vision 2030, and the study's findings will guide initiatives to empower women as vital economic growth and sustainable development drivers in Saudi Arabia.

The research findings deliver vital implications for Saudi Arabian women entrepreneurs and simultaneously provide worldwide insights to support inclusive sustainable entrepreneurship development. The research investigates various factors that impact women's empowerment in entrepreneurship to identify intricate patterns, which affect their entrepreneurial possibilities. The research results offer essential knowledge, which worldwide policymakers and stakeholders can use to create initiatives that support women entrepreneurs while promoting gender equality and economic growth. The exchange of successful practices and innovative approaches and impactful interventions between borders enables women entrepreneurs worldwide to benefit from knowledge sharing. The collaborative method serves as a vital component for establishing an equitable entrepreneurial

environment, which allows women to achieve their full potential to drive positive change and sustainable development.

One other policy recommendation involves establishing the women entrepreneurship empowerment program to support Saudi Arabian women entrepreneurs through psychological assistance, educational programs, and economic benefits. The program should establish mentorship programs that connect female entrepreneurs with established businesswomen to develop knowledge sharing and confidence growth. The government needs to create targeted financial assistance programs through grants for startups owned by women to eliminate economic obstacles while encouraging innovation. The government should enhance educational opportunities by providing high-quality entrepreneurship training and vocational programs, which will equip women with the necessary business skills to succeed in competitive markets. A women entrepreneurship empowerment program can transform the general entrepreneurial ecosystem by creating a complete policy framework, which address physiological, educational, and economic aspects to enable women's economic success, which supports the Vision 2030 and sustainable development in Saudi Arabia (Khanm, 2016).

### Limitations and directions for future research

The study's findings may be limited by the sample size of participants, which may limit the generalizability of the results to a larger population of women entrepreneurs in Saudi Arabia. This means that the use of self-reported data or certain data collection methods may introduce bias or limitations in capturing the full range of factors that affect women's empowerment in entrepreneurship.

The study's focus on Saudi Arabia may limit the transferability of findings to other cultural or socioeconomic contexts, highlighting the need for cross-cultural studies. The study's timeframe may have restricted the depth of analysis or the ability to capture the long-term effects of the identified factors on women's empowerment in entrepreneurship. A study that tracks the development of psychological, economic, and educational factors on women's empowerment in entrepreneurship over time will be useful in comparing the experiences of women entrepreneurs in Saudi Arabia with those in other countries to identify common challenges and best practices for empowerment.

The research will gather qualitative information to understand the real-life experiences and views of Saudi Arabian women entrepreneurs while examining how their age and educational background and business sector influence their empowerment in entrepreneurship. The study will help policymakers assess the current policies and programs that support women entrepreneurs in Saudi Arabia. The evaluation process helps policymakers identify which areas require improvement and innovation to develop initiatives that address the specific needs and challenges of women entrepreneurs. The evaluation and refinement process establishes a supportive environment, which enables women entrepreneurs to succeed, thus driving economic growth and social development in Saudi Arabia.

The research would gain value from analyzing Saudi Arabian women's entrepreneurial goals and self-empowerment development across different life stages, including marriage and aging. The research focuses on young single women because 97.4% of participants are under 30 years old and 90.4% remain unmarried, which makes this demographic particularly important. The research fails to investigate how women's motivations and challenges and empowerment levels transform during various life stages. The study of married women versus women over 30 and their entrepreneurial participation rates would provide a deeper understanding of women's empowerment patterns in Saudi Arabia's cultural and economic framework. The research results

would help create specific policy interventions that provide support to women entrepreneurs throughout their business development process.

### Conclusion

The research on women's empowerment in Saudi Arabian entrepreneurship through psychological, market condition, economic, sociocultural, entrepreneurial orientation, education, and skills factors delivers important insights about the multiple influences on women entrepreneurs in Saudi Arabia. The research shows that psychological factors, together with economic opportunities, entrepreneurial orientation, and education and skills development, are important for women to achieve business success. The research shows that market conditions and sociocultural factors have little effect on women's empowerment, yet it emphasizes the need for specific approaches that address the various obstacles women entrepreneurs in Saudi Arabia face. Policymakers and stakeholders can develop targeted support interventions for women in business by understanding the relationship between these factors and their effects on women's empowerment. The entrepreneurial ecosystem requires additional research and collaborative work to support gender equality while advancing Saudi Arabia's Vision 2030 sustainable development goals.

The research results deliver important implications for Saudi Arabian women entrepreneurs while offering worldwide insights to boost inclusive sustainable entrepreneurship. The research investigates various factors that impact women's empowerment in entrepreneurship to identify intricate patterns, which affect their entrepreneurial possibilities. The research findings offer essential knowledge which, worldwide policymakers and stakeholders can use to create initiatives that help women entrepreneurs while promoting gender equality and economic development. Knowledge sharing between borders facilitates the exchange of successful practices and innovative approaches and impactful interventions which, support women entrepreneurs worldwide. The collaborative approach serves as a basic requirement for constructing an equitable entrepreneurial ecosystem, which enables women to function as catalysts for sustainable development and positive change.

### Data availability

The data that support the findings of this study are available on request from the corresponding author, [YH]. The data are not publicly available due to their containing information that could compromise the privacy of research participants.

Received: 20 June 2024; Accepted: 9 June 2025;

Published online: 20 June 2025

### References

- Ab Hamid MR, Sami W, Sidek MM (2017) Discriminant validity assessment: use of Fornell & Larcker criterion versus HTMT criterion. *Pap Presente J Phys Conf Ser* 890(1):012163
- Abd El Basset F, Bell R, Al Kharusi B (2024) Reducing barriers to female entrepreneurship in Oman: does family matter? *J Enterprising Communities People Places Glob Econ* 18(6):1241–1260
- Abdallah W, Harraf A, Ghura H, Abrar M (2024) Financial literacy and small and medium enterprises' performance: the moderating role of financial access. *J Financial Rep Account*
- Abdullahi AI, Zainol FA (2016) The impact of socio-cultural business environment on entrepreneurial intention: a conceptual approach. *Int J Acad Res Bus Soc Sci* 6(2):80–94
- Abou-Moghli AA, Al-Abdallah GM (2019) A systematic review of women entrepreneurs' opportunities and challenges in Saudi Arabia. *J Entrep Educ* 22(6):1–14

- Agarwal S, Lenka U, Singh K, Agrawal V, Agrawal AM (2020) A qualitative approach towards crucial factors for sustainable development of women social entrepreneurship: Indian cases. *J Clean Prod* 274:123135
- Ainurrofiq F, Khasanah N (2024) From domestic to public: the construction of women's empowerment discourse in Saudi Arabia's Vision 2030. *Akademika J Pemikir Islam* 29(1):101–116
- Ajiva OA, Ejike OG, Abhulimen AO (2024) Empowering female entrepreneurs in the creative sector: overcoming barriers and strategies for long-term success. *Int J Adv Econ* 6(08):424–436
- Al Chami R, Youssef MH (2025) Challenging patriarchy: the transformation of Women's Roles Under Saudi Arabia's Vision 2030. In *Impact of Patriarchy and Gender Stereotypes on Working Women: Exploring its Past, Present and Future*. Cham: Springer Nature Switzerland, pp 121–145
- Al-Bakr F, Bruce ER, Davidson PM, Schlaffer E, Kropiunigg U (2017) Empowered but not equal: challenging the traditional gender roles as seen by University Students in Saudi Arabia. In *FIRE: Forum for international research in education*. Lehigh University Library and Technology Services. pp 52–66
- Al-Ghamri N (2016) Challenges facing businesswomen and their negative impact on the performance of small businesses in the province of Jeddah in Saudi Arabia. *Int J Bus Manag* 11(9):96–116
- Ali A, Kelley DJ, Levie J (2020) Market-driven entrepreneurship and institutions. *J Bus Res* 113:117–128
- Ali RS (2018) Determinants of female entrepreneurs' growth intentions: A case of female-owned small businesses in Ghana's tourism sector. *J Small Bus Enterpr Dev* 25(3):387–404
- Aljarodi AM, Thatchenkery T, Urbano D (2024) Female entrepreneurship in the start-up ecosystem of Saudi Arabia. *J Enterpr Communities: People Places Glob Econ*
- Al-Mamary YH, Abubakar AA (2023) Breaking barriers: the path to empowering women entrepreneurs in Saudi Arabia. *J Ind Integr Manag* 1:46
- Al-Mamary YH, Alshallaqi M (2022) Impact of autonomy, innovativeness, risk-taking, proactiveness, and competitive aggressiveness on students' intention to start a new venture. *J Innov Knowl* 7(4):100239
- Al-Mamary YH, Alwaheeb MA, Alshammari NGM, Abdulrab M, Balhareth H, Soltane HB (2020) The effect of entrepreneurial orientation on financial and non-financial performance in Saudi SMEs: a review. *J Crit Rev* 7(14):270–278
- Al-Mamary YH (2025a) The transformative power of artificial intelligence in entrepreneurship: exploring AI's capabilities for the success of entrepreneurial ventures. *Future Bus J* 11(1):104
- Al-Mamary YH (2025b) Factors shaping green entrepreneurial intentions towards green innovation: an integrated model. *Future Bus J* 11(1):21
- Almutarie AO (2025) Joining the Workforce. *Saudi Women and Vision 2030*. In *Tech Open*. <https://doi.org/10.5772/intechopen.1008278>
- Alraddadi R, AlQahtani S, Almubarak N (2024) Empowering the disadvantaged: a perspective on Saudi Arabia's low-skilled female workers. *J Gender Stud* 33:902–916
- Alreshoodi SA, Rehman AU, Alshammari SA, Khan TN, Moid S (2022) Women entrepreneurs in Saudi Arabia: a portrait of progress in the context of their drivers and inhibitors. *J Enterprising Cult* 30(03):375–400
- Alshebami AS (2024) Fuelling entrepreneurial success: Unravelling the nexus of financial resources, self-efficacy, outcome expectations and entrepreneurial intentions in Saudi micro and small enterprises. *Discov Sustain* 5(1):62
- Alshebami AS (2023) Green innovation, self-efficacy, entrepreneurial orientation and economic performance: Interactions among Saudi small enterprises. *Sustainability* 15(3):1961
- AlSondosa IAA, Salamehb AAM (2020) The effect of system quality and service quality toward using m-commerce service, based on con-sumer perspective. *Manag Sci Lett* 10:2489–2596
- Altaf M, Ullah K, Atiq M (2024) Women-owned businesses and access to finance in Pakistan: a study of perceptions, experiences and behaviors. *Qual Res Financial Mark*
- Aly M, Audretsch DB, Grimm H (2021) Emotional skills for entrepreneurial empowerment: the promise of entrepreneurship education and policy. *J Technol Transf* 46(5):1611–1629
- Amini A, Hoseini SS, Haqbin A, Shahin V (2024) Toward recognizing characteristics of women's entrepreneurial intelligence: a comparative study. *Int J Innov Sci* 16:683–708
- Ang FJL, Cheung YB, Gandhi M, Østbye T, Malhotra C, Malhotra R, Chow CC, Chong PH, Amin Z, Tan TSZ (2024) PRECIOUS demonstrated satisfactory measurement properties for assessing the quality of care for children with serious illnesses. *J Clin Epidemiol* 168:111286
- Anggadwita G, Indarti N (2025) Thematic analysis of women entrepreneurship in the internationalization of small and medium-sized enterprises (SMEs). *J Entrep Emerg Econ* 17(1):45–72
- Appolloni A, Gaddam S (2009) Identifying the effect of psychological variables on entrepreneurial intentions. *DSM Bus Rev* 1(2):61–86
- Assaf A (2024) Impact of social entrepreneurship on women empowerment through financial inclusion an analytical study from the Kingdom of Saudi Arabi. *Pak J Life Soc Sciences* 22(1):4993–5009
- Baharum H, Ismail A, Awang Z, McKenna L, Ibrahim R, Mohamed Z, Hassan NH (2023) The study adapted instruments based on Confirmatory Factor Analysis (CFA) to validate measurement models of latent constructs. *Int J Environ Res Public Health* 20(4):2860
- Bayisenge R, Shengede H, Harimana Y, Bosco Karega J, Lukileni M, Nasrullah M, Emmrance Nteziyaremye B (2020) Contribution of small and medium enterprises run by women in generating employment opportunity in Rwanda. *Int J Bus Manag* 15(3):1833–8119
- Boldureanu G, Ionescu AM, Bercu AM, Bedrule-Grigoriu MV, Boldureanu D (2020) Entrepreneurship education through successful entrepreneurial models in higher education institutions. *Sustainability* 12(3):1267
- Cardella GM, Hernández-Sánchez BR, Sánchez-García JC (2020) Women entrepreneurship: a systematic review to outline the boundaries of scientific literature. *Front Psychol* 11:536630
- Castañó MS, Méndez MT, Galindo MÁ (2015) The effect of social, cultural, and economic factors on entrepreneurship. *J Bus Res* 68(7):1496–1500
- Chatterjee N, Das N (2015) Key psychological factors as predictors of entrepreneurial success: a conceptual framework. *Acad Entrep J* 21(1):102
- Cheung GW, Cooper-Thomas HD, Lau RS, Wang LC (2023) Reporting reliability, convergent and discriminant validity with structural equation modeling: a review and best-practice recommendations. *Asia Pac J Manag* 41:745–783
- Correa VS, Lima RMD, Brito FRDS, Machado MC, Nassif VMJ (2024) Female entrepreneurship in emerging and developing countries: a systematic review of practical and policy implications and suggestions for new studies. *J Entrep Emerg Econ* 16(2):366–395
- Crockett SA (2012) A five-step guide to conducting SEM analysis in counseling research. *Counseling Outcome Res Eval* 3(1):30–47
- Dess GG, Lumpkin GT (2005) The role of entrepreneurial orientation in stimulating effective corporate entrepreneurship. *Acad Manag Perspect* 19(1):147–156
- Dushkova D, Ivlieva O (2024) Empowering communities to act for a change: a review of the community empowerment programs towards sustainability and resilience. *Sustainability* 16(19):8700
- El-Shaeri N (2024) Saudi Arabia a beacon for female entrepreneurship, according to industry leaders. *Arab News*. Retrieved June 5, 2024, from <https://www.arabnews.com/node/2491916/business-economy>
- Ferguson E, Cox T (1993) Exploratory factor analysis: A users' guide. *Int J Selection Assess* 1(2):84–94
- Gupta A, Swain PC, Mishra RR, Joshi S, Andrabi R (2024) Examine the possibilities and obstacles of global business expansion. *J Inform Educ Res* 4(2):635–643
- Gupta S, Wei M, Tzempelikos N, Shin MM (2024) Women empowerment: challenges and opportunities for sustainable development goals. *Qualitative Mark Res Int J* 27(4):608–630
- Hair Jr JF, Matthews LM, Matthews RL, Sarstedt M (2017) PLS-SEM or CB-SEM: updated guidelines on which method to use. *Int J Multivar Anal* 1(2):107–123
- Hasan FS, Almubarak MMS (2016) Factors influencing women entrepreneurs' performance in SMEs. *World J Entrep Manag Sustain Dev* 12(2):82–10
- Hu A, Zhou S (2024) China's "Miracle of Poverty Reduction": from an extremely poor Country to a moderately prosperous society in all respects. In *China in 2035: Towards a Society of Common Prosperity for All*. Singapore: Springer Nature Singapore, pp 1–29
- Hussain M, Rehman R, Bashir U (2024) Female CEOs and SME's financing decision: evidence from firm-level data. *Asia-Pac J Bus Admin* 17:70–94
- Javed A, Yasir M, Majid A (2018) Psychological factors and entrepreneurial orientation: could education and supportive environment moderate this relationship? *Pak J Commerce Soc Sci* 12:571–597
- Kayed H, Al-Madadha A, Abualbasal A (2022) The effect of entrepreneurial education and culture on entrepreneurial intention. *Organizacija* 55(1):18–34
- Khalid R, Raza M, Piwowar-Sulej K, Ghaderi Z (2024) There is no limit to what we as women can accomplish: promoting women's entrepreneurial empowerment and disaster management capabilities. *J Hosp Tour Insights* 8:393–419
- Khan MUH (2016) Saudi Arabia's vision 2030. *Def J* 19(11):36
- Khatun F, Kabir ATMF (2014) Women SME Entrepreneurs in ensuring women empowerment in Bangladesh: a study on women SME entrepreneurs in Bangladesh. *Am Int J Res Humanities Arts Soc Sci* 5(1):61–65
- Khoury G, Elmuti D, Omran O (2012) Does entrepreneurship education have a role in developing entrepreneurial skills and ventures' effectiveness? 15. Accession Number: 289621052. <http://hdl.handle.net/20.500.11889/2670>
- Kline RB (2023) Principles and practice of structural equation modeling. Guilford publications
- Koe WL (2016) The relationship between Individual Entrepreneurial Orientation (IEO) and entrepreneurial intention. *J Glob Entrep Res* 6:1–11
- Koe WL, Majid IA (2014) Socio-cultural factors and intention towards sustainable entrepreneurship. *Eurasia J Bus Econ* 7(13):145–156
- Koneru K (2017) Women entrepreneurship in India-problems and prospects. Available at SSRN 3110340
- Kosárová D (2020) Saudi Arabia's vision 2030. In *Security forum* (pp. 124–134). Banská Bystrica, Slovakia: Interpolis

- Kumari J, Singh P, Mishra AK, Meena BPS, Singh A, Ojha M (2024) Challenges hindering women's involvement in the hospitality industry as entrepreneurs in the era of digital economy. In *Revolutionizing the AI-Digital Landscape*. Productivity Press, pp 129–137
- Kurczewska A, Doryń W, Wawrzyniak D (2020) An everlasting battle between theoretical knowledge and practical skills? The joint impact of education and professional experience on entrepreneurial success. *Entrep Behav Res* 8(2):219–237
- Kyrgidou LP, Petridou E (2013) Developing women entrepreneurs' knowledge, skills and attitudes through e-mentoring support. *J Small Bus Enterp Dev* 20(3):548–566
- Li J, Qu J, Huang Q (2018) Why are some graduate entrepreneurs more innovative than others? The effect of human capital, psychological factor and entrepreneurial rewards on entrepreneurial innovativeness. *Entrep Regional Dev* 30(5-6):479–501
- Macías-Prada JF, Silva Y, Zapata ÁM (2024) The role of universities in Latin American social entrepreneurship ecosystems: a gender perspective. *Int J Gend Entrep* 16(1):47–68
- Martens CDP, Machado FJ, Martens ML, de Freitas HMR (2018) Linking entrepreneurial orientation to project success. *Int J Proj Manag* 36(2):255–266
- Mehtap S, Pellegrini MM, Caputo A, Welsh DH (2017) Entrepreneurial intentions of young women in the Arab world: Socio-cultural and educational barriers. *Int J Entrep Behav Res* 23(6):880–902
- Moral IH, Rahman MM, Rahman MS, Chowdhury MS, Rahaman MS (2024) Breaking barriers and empowering marginal women entrepreneurs in Bangladesh for sustainable economic growth: a narrative inquiry. *Soc Enterp J* 20(4):585–610
- Mullins JW (1996) Early growth decisions of entrepreneurs: the influence of competency and prior performance under changing market conditions. *J Bus Venturing* 11(2):89–105
- Nigam N, Shatila K (2024) Entrepreneurial intention among women entrepreneurs and the mediating effect of dynamic capabilities: empirical evidence from Lebanon. *Int J Entrep Behav Res* 30(4):916–937
- Noguera M, Alvarez C, Urbano D (2013) Socio-cultural factors and female entrepreneurship. *Int Entrep Manag J* 9:183–197
- Noor S, Isa FM, Nor LM (2021) Women empowerment through women entrepreneurship: a comparison between women entrepreneurs and fulltime housewife in Pakistan. *Iran J Manag Stud* 14(2):347–363
- Orozco Collazos LE, Botero IC (2024) Women ownership as a form of leadership: the role of context in understanding its effects on financial performance. *BRQ Bus Res Q* 27(1):57–72
- Pant M, Farrell M (2007) Gender and governance: empowering women's leadership. In: Tandon R, Kak M (eds), *Citizen Particip Democratic Govern: In our Hands*, Ashok Kumar Mittal Concept Publishing Company, New Delhi, pp 105–136
- Polok BM (2024) Empowering Women in Labor Market: a comprehensive analysis of recent legal developments in the Kingdom of Saudi Arabia. *Yearb Islamic Middle East Law Online* 1(aop):1–17
- Powell C, Chang AM (2016) Women in tech as a driver for growth in emerging economies. Council on Foreign Relations, New York, NY
- Rath P, Panda UC, Bhatta D, Sahu KC (2009) Use of sequential leaching, mineralogy, morphology and multivariate statistical technique for quantifying metal pollution in highly polluted aquatic sediments—A case study: Brahmani and Nandira Rivers, India. *J Hazard Mater* 163(2-3):632–644
- Raza A, Yousafzai S, Saeed S (2024) Breaking barriers and bridging gaps: the influence of entrepreneurship policies on women's entry into entrepreneurship. *Int J Entrep Behav Res* 30(7):1779–1810
- Richard T (2025) A discourse of women entrepreneurship policy in Canada. *J Int Council Small Bus* 1–22. <https://doi.org/10.1080/26437015.2025.2457609>
- Ringle CM, Sarstedt M, Mitchell R, Gudergan SP (2020) Partial least squares structural equation modeling in HRM research. *Int J Hum Resour Manag* 31(12):1617–1643
- Rodríguez-López Á, Souto JE (2019) Empowering entrepreneurial education using undergraduate dissertations in business management and entrepreneurship: a five-year study (2012–2016). *Educ + Train* 61(2):255–271
- Rokeman NRM (2024) Likert measurement scale in education and social sciences: explored and explained. *EDUCATUM J Soc Sci* 10(1):77–88
- Rosique-Blasco M, Madrid-Guijarro A, García-Pérez-de-Lema D (2016) Entrepreneurial skills and socio-cultural factors: an empirical analysis in secondary education students. *Educ + Train* 58(7/8):815–831
- Sabri MS (2021) Women entrepreneurs in micro, small and medium-sized enterprises (MSMES): analysis of practice in Saudi Arabia (Doctoral dissertation, Victoria University)
- Sadler GR, Lee HC, Lim RSH, Fullerton J (2010) Recruitment of hard-to-reach population subgroups via adaptations of the snowball sampling strategy. *Nurs health Sci* 12(3):369–374
- Saleh W, Malibari A (2021) Saudi women and Vision 2030: Bridging the gap? *Behav Sci* 11(10):132
- Sangolagi K, Alagawadi M (2016) Women entrepreneurs. *Int J Adv Eng Techno, Manag Appl Sci* 3(1):216–222
- Şanlı O, Sahu P, Janjua LR (2024) Underlying the impact of economic, social, and governance adaptation on poverty reduction under the shadow of external financial inflows—panel estimation from the sub-saharan region. In *Sustainable Economic Development: Fostering the United Nations Goals*. Singapore: Springer Nature Singapore, pp 153–179
- Santos GMC, Marques CS, Ferreira JJ, Gerry C, Ratten V (2017) Women's entrepreneurship in Northern Portugal: psychological factors versus contextual influences in the economic downturn. *World Rev Entrep Manag Sustain Dev* 13(4):418–440
- Sarstedt M, Ringle CM, Hair JF (2021) Partial least squares structural equation modeling. Springer, *Handbook of market research*, pp 587–632
- Sato Y, Tabuchi T, Yamamoto K (2012) Market size and entrepreneurship. *J Econ Geogr* 12(6):1139–1166
- Siba E (2019) Empowering women entrepreneurs in developing countries. *Development* 105:189–200
- Sidek S, Zainol FA (2011) Psychological traits and business performance of entrepreneurs in small construction industry in Malaysia. *Int Bus Manag* 2(1):170–185
- Tambunan T (2009) Women entrepreneurship in Asian developing countries: their development and main constraints. *J Dev Agric Econ* 1(2):27–40
- Thelma CC, Ngulube L (2024) Women in leadership: examining barriers to women's advancement in leadership positions. *Asian J Adv Res Rep*. 18(6):273–290
- Timilsina GR, Dissou Y, Toman M, Heine D (2024) How can a carbon tax benefit developing economies with informality? A CGE analysis for Côte d'Ivoire. *Clim Policy* 24(1):71–86
- Toma SG, Grigore AM, Marinescu P (2014) Economic development and entrepreneurship. *Procedia Econ Financ* 8:436–443
- Turkina E, Thai MTT (2015) Socio-psychological determinants of opportunity entrepreneurship. *Int Entrep Manag J* 11:213–238
- Ullah S, Gul A, Shah SM, Uzair M, Khan K, Ismail M, Amjad MJ (2025) Impact of female education on the economic growth: a case study of Pakistan. *J Asian Dev Stud* 14(1):205–217
- Vaithilingam S, Ong CS, Moisescu OI, Nair MS (2024) Robustness checks in PLS-SEM: a review of recent practices and recommendations for future applications in business research. *J Bus Res* 173:114465
- Vakili F, Tahmasebi N, Tahmasebi S, Tahmasebi D (2016) Role of education in entrepreneurship development. *J Ecophysiol Occup Health* 16(3/4):78–87
- Venter A (2014) An analysis of the influence of entrepreneurial orientation on business success in selected small and medium-sized enterprises (Doctoral dissertation)
- Wakibi S, Oleche M (2024) A study on women in the labour Force in Kenya. Women's Economic Empowerment Hub (WEE-Hub). University of Nairobi
- Welsh DH, Memili E, Kaciak E, Al Sadoon A (2014) Saudi women entrepreneurs: a growing economic segment. *J Bus Res* 67(5):758–762
- Yeboah SA, Mogre D (2024) Breaking Barriers: The impact of gender equality on economic success: a comprehensive review. *J Manag Sci* 14(3):70–80
- Yoopetch C (2021) Women empowerment, attitude toward risk-taking and entrepreneurial intention in the hospitality industry. *Int J Cult Tour Hospitality Res* 15(1):59–76
- Zadorina O, Burchak L, Panas O, Ardellian O, Apalat H (2023) Shaping the competencies of the future: the importance of developing soft skills in higher education. *Cad de Educ çao Tecnologia e Soc* 16(2):361–371
- Zamberi Ahmad S (2011) Evidence of the characteristics of women entrepreneurs in the Kingdom of Saudi Arabia: an empirical investigation. *Int J Gend Entrep* 3(2):123–143
- Zhang Q, Shi P, Singh VP, Fan K, Huang J (2017) Spatial downscaling of TRMM-based precipitation data using vegetative response in Xinjiang, China. *Int J Climatol* 37(10):3895–3909
- Zamil A, Abu-ALsondos I, Salameh A (2020) Encouraging consumers to make online purchases using mobile applications, How to keep them in touch with e-services providers? *Int J Interact Mob Technol* 14(17):56–65

### Acknowledgements

This research has been funded by Scientific Research Deanship at University of Ha'il - Saudi Arabia through project number «RCP-24 096».

### Author contributions

Conceptualization: Y.H., A.A.A., and A.A.A.; methodology: Y.H. and A.A.A.; resources: Y.H., A.A.A., and A.A.A.; data curation: Y.H., A.A.A., and A.A.A.; data collection and data analysis: Y.H. and A.A.A.; writing—original draft preparation: Y.H., A.A.A., and A.A.A.; writing—review and editing: Y.H., A.A.A., and A.A.A.; supervision: Y.H.; project administration: Y.H.; funding acquisition: Y.H., A.A.A., and A.A.A. All authors have read and agreed to the published version of the manuscript.

### Competing interests

The authors declare no competing interests.

### Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The study was approved by the Research Ethics Committee (REC) at the University of Hail (No. H-2025-601) on 10/02/2024.

### Informed consent

Informed consent was electronically obtained in writing from all participants before their involvement in the study. Conducted via an online questionnaire, the consent process included a dedicated section explaining the study's purpose, procedures, data usage, and participants' rights, including voluntary participation and withdrawal without consequences. Participants confirmed consent by selecting an "Agree" button; those who declined were redirected away from the survey. Data collection took place between March and May 2024, overseen by the principal investigator and co-researchers. Consent was obtained directly from adult participants, without third-party involvement, as they were legally capable of providing consent independently. All data were collected and processed anonymously, with no personally identifiable information disclosed. Participants were given the opportunity to contact the researchers for clarifications before consenting. The study did not involve vulnerable individuals, and no financial or material incentives were provided.

### Additional information

**Correspondence** and requests for materials should be addressed to Yaser Hasan Al-Mamary.

**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