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Entrepreneurial mindset: Skills, attitudes, and intentions in information technology

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ABSTRACT

This study explores the association between entrepreneurial skills, attitudes toward behavior (ATB), and entrepreneurial intentions among information technology (IT) professionals, drawing on the theory of planned behavior. It investigates how ATB influences the relationship between skills and intentions, providing insights into entrepreneurship within technology-driven industries. The study positions ATB as a key moderating factor, expanding existing models by showing how attitudes shape entrepreneurial intentions alongside skills. Using a cross-sectional survey of 376 IT professionals selected through simple random sampling, the hypothesized relationships were tested using partial least squares structural equation modeling. Results reveal that ATB significantly moderates the impact of skills on entrepreneurial intentions, suggesting that fostering both positive attitudes and relevant skills can promote entrepreneurial capacity. These findings offer practical implications for policy makers, educators, and practitioners to create enabling conditions, develop targeted skill-building initiatives, and strengthen entrepreneurial ecosystems. This research makes a theoretical contribution to understanding intent formation in technology sectors.

KEYWORDS

Entrepreneurial intentions; attitude toward behavior; entrepreneurship skills; information technology

Introduction

Modern entrepreneurship is appreciated as one of the key driving forces within global economy growth and social development (Bullough et al., 2022; Global Entrepreneurship Monitor [GEM], 2021; Saberi & Hamdan, 2019; World Bank, 2018). In recent years, as countries attempt to grapple with issues arising from advanced technological systems, global and economic uncertainty, and change, entrepreneurship surfaces as a potent avenue for creating employment, economic growth, and development (Baller et al., 2016; Sutrisno et al., 2023; Zhang et al., 2021). In developing economies more specifically, entrepreneurship is perceived as a double-edged sword in decreasing high unemployment rates, closing the gap of economic inequality, and

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enthusing youths in productive actions leading to positive changes in society (World Bank, 2018). For this purpose, emerging economies are now directing efforts to develop entrepreneurial contexts that will enhance young people's capacity to contribute positively to economic reconstruction and society upliftment (De Villiers et al., 2021; Global Entrepreneurship Research Association, 2021; Nakpodia et al., 2024).

Entrepreneurship is commonly examined from two main perspectives: The first strand relates to the macro level, which emphasizes the macroeconomic and social effects of entrepreneurship, and the second one is the effects at the micro level, which includes the cognition, affect, and behavior of the individuals (Dutta et al., 2021; Gregori et al., 2021; Roundy & Lyons, 2023). At the micro level, they adjust resources, recognize operations and potential adaptations, and transform them into new ventures that advance the growth of an economy (Lucas, 2014). Entrepreneurial self-employment is a purposeful process that is premeditated by cognitive and motivational components; personal intentions suggest the entrepreneurial readiness and motivation to engage in entrepreneurial activities (Masenya, 2021; Rengiah & Sentosa, 2014; Solymossy, 1998). Hence, entrepreneurial intentions are crucial variables to explain entrepreneurial behavior inasmuch as the entrepreneurial actions are contingent or sporadic, as they can reveal an individual's willingness to develop an entrepreneurial career and pursuing certain objectives (Meoli et al., 2020).

In Pakistan, however, the pattern of entrepreneurship remained under pressure and the activities in this business role remained slow as compared to other countries, particularly in the South Asian region, including Bangladesh, India, and Sri Lanka (Altaf, 2023; GEM, 2021; Haque, 2007). According to GEM (2021), 27.9 percent of the Pakistani population has an interest in engaging in business activities, although only 3.65 percent have engaged in early-stage activities; they thus experience considerable difficulties to proceed from further intention to action. Such a low total entrepreneurial activity rate—Pakistan's score of 138 among the 189 countries in the World Bank's Ease of Doing Business index (World Bank, 2018)—testifies to the high hurdles facing Pakistani entrepreneurs. These barriers include inadequate access to funding, scarcity of training programs available for entrepreneurs, stringent business legislation, and, foremost, lack of institutional support that hampers self-employment activities and discourages people from starting their businesses (Farhangmehr et al., 2016; Noor et al., 2023; Shabbir et al., 2016).

In light of these challenges, a number of Pakistani government policies and programs have provided financial incentives, training programs, and regulatory adjustments for promoting entrepreneurial activities. However, these appear insufficient considering the large gap between entrepreneurial intentions and actual entrepreneurial actions that has been observed by researchers such as Irfan et al. (2023) and Rachmawan et al. (2015). The GEM (2021)

highlighted an imbalance: while culture and policy models may foster entrepreneurial plans to an extent, more profound and consistent barriers to would-be entrepreneurial initiatives remained, constraining the creation of a sustainable culture and system of entrepreneurship. This emphasized the wish to study the factors that operate at the individual level with an eye on self-efficiency, attitude toward behavior, and perceived membership that can exert tremendous influence over the intentions of the entrepreneurial venture in Pakistan.

While the literature has previously concentrated mainly on these factors, including social culture, the economy, and resources that influence start-up work, there is a lack of insight into internal determinants of entrepreneurial intentions, specifically regarding Pakistan's fast-growing information technology (IT) industry (Bilén et al., 2005; Leitch & Harrison, 1999; Mitchelmore & Rowley, 2010). Due to the high growth rate and specific nature of the problems and opportunities related to the IT sector, the given field is promising for analyzing the formation of entrepreneurial intentions. This study, therefore, aims at arresting this gap by assessing the relationship between entrepreneurial skills (EPS), attitude, and perception of feasibility and the intention of Pakistani IT professionals to embark on entrepreneurship.

In doing so, this work contributes to the knowledge on individual-level factors that are important for the formation of intentions to engage in entrepreneurship, and provides policy, education, and industry implications for Pakistan as well as for other emerging economies. These findings might also help design more enhance intervention programs that would help those with entrepreneurial intentions to cross the gap and become active and successful entrepreneurs in high-potential sectors like IT. Finally, this work seeks to enhance the principles of entrepreneurship in Pakistan and improve the structural framework of the country's entrepreneurial environment in order to foster a more robust economy.

Literature review

EPS

What is entrepreneurship? Would it be reasonable to share that entrepreneurship is a characteristic behavior brought out by specific traits (Ajzen, 1991; Dhir et al., 2021; Sahrah et al., 2023)? But this argument has been refuted by scholars who have postulated that, while entrepreneurship traits may be inherent, skills involved in entrepreneurship are learned (Lichtenstein & Lyons, 2001). When utilized to its extreme, entrepreneurship can be defined as a natural attribute, meaning that it cannot be trained for, for the simple reason that one cannot change a person's

nature. Such a shift of perspective reaffirms the need for EPS development, which will help to encourage entrepreneurial intentions in individuals lacking inherent attributes, although they might be capable of acquiring the relevant skills (Lichtenstein & Lyons, 2001).

In this context, EPS are defined as the competencies needed to identify opportunities and to create sustainable profits from these opportunities. These skills therefore include personal and financial traits suitable for operation in competitive business conditions and adequate finance (Argade et al., 2021). It can be stated that entrepreneurs who possess a high level of skill in sensing opportunities are likely to have high levels of entrepreneurial intent because this skill helps them manage the organization and overcome obstacles (Chell, 2013; Shahzad et al., 2021; Sim, 2005). Therefore, one might argue that entrepreneurial success can be better divided on the basis of skills, which corresponds to the attitudes toward behavior (ATB) framework that has it that antecedent conditions toward a business venture, combined with skill, will see the individual exhibit high levels of entrepreneurial intention (Asad et al., 2008; Lichtenstein & Lyons, 2001).

Besides, it has been established that, unlike formal education and experience, specific EPS play a greater role in decision making, given that they prepare people for cut-throat competition and create social capital needed for entrepreneurial growth (Galvão et al., 2020; Khedhaouria et al., 2015; Liguori et al., 2020; Mai & Dickel 2023; Munawar et al., 2023). Besides, the match of self-employment competencies with other relevant competencies like leadership boosts one's capability to address the start-up difficulties afloat. As will be recalled, according to the ATB framework, EPS are considered to play an important role in influencing entrepreneurial intentions because they enable people to develop and actualize their visions of being entrepreneurs. Based on the preceding discussion, the following hypotheses are proposed:

H1: EPS have a significant positive effect on the entrepreneurial intentions of IT professionals.

H2: EPS have a significant positive effect on the ATB of IT professionals.

ATB

Knowledge toward behavior is defined as an individual's belief about the features of a given behavior; specifically, an individual's belief about the feasibility of undertaking an entrepreneurial activity. According to the theory of planned behavior (TPB), ATB is situated between the individual's

intentions and outside factors to explain how attitudes determine the propensity toward a course of action (Krueger et al., 2000). The aspects of ATB include attitudes toward competitiveness, change, and financial risk, because these are factors that are crucial to the formation of enterprising culture and thus entrepreneurial intention (Jadmiko, 2021).

To support this argument, Kim and Hunter (1993) conducted a meta-analysis that affirmed that a mature empirical link to examine the relation between ATB and behavioral intentions demonstrates that positive attitudes lead to incremental probability of behavior intention. In the present study, among entrepreneurs, a positive ATB regarding risk-taking and innovation corresponds to a higher intention of engaging in entrepreneurial activities. This is especially so in the case of IT experts who work under enormous pressures when it comes to making decisions as well as changes that are fast occurring in the technological world, making ATB an important predictor of intentions to become an entrepreneur (Kim & Hunter, 1993). Therefore, this study seeks to establish the mediating effect of ATB on the relationship between EPS and intention toward entrepreneurship, proposing that a positive ATB among persons with strong EPS will enhance the probability of the individual to take up entrepreneurship.

H3: ATB has a substantial effect on the entrepreneurial intentions of IT professionals.

H4:ATB positively mediates the relationship between EPS and entrepreneurial intentions of IT professionals.

Entrepreneurial intentions

Entrepreneurial intentions include the purposeful plan toward enterprise management; for instance, new venture creation or self-employment (Al-Mamary & Alshallaqi, 2022; Martins et al., 2023). Predicatively, in this study, entrepreneurial intentions are taken as the intended decision to engage in self-employment, in line with the TPB model that defines intention as the constituent variable of the planned behavior (Ajzen, 1991). Intentions are most relevant in entrepreneurship because they reflect an individual's willingness to begin business endeavors despite challenges, implying passionate determination and thrill for risk (Krueger et al., 2000).

Based on TPB theory, the first part of entrepreneurial action is intention; then it passes on to other steps, such as conducting market research and business planning (Jena, 2020). Only those people with higher scores in measurements of entrepreneurial intentions will act in ways that lead to the creation of their businesses. Furthermore,

entrepreneurial intentions offer image and dedication regarding the potential entrepreneur, especially in areas where entrepreneurship changes into a hard task (Gubik, 2021; Hoda et al., 2020; Lüthje & Franke, 2003). While a large number of studies global and local have examined factors that affect the intentions of the subject to become an entrepreneur, there is limited information on the effect of skills on intentions in emerging economy countries such as Pakistan (Haque, 2007; Zafar et al., 2013).

Based on the scarcity of published research relating to the impact of EPS and ATB on intentions in the context of Pakistan's IT industry, the current research aims at extending existing knowledge of the interaction between EPS and intentions through the mediation of ATB. This approach emphasizes ATB as a mediator between skills and intentions and offers a new understanding of the individual factors influencing entrepreneurial actions in emerging economies.

Underpinning theory

The TPB is an integrated conceptual model advanced by Ajzen (1991) that provides an extensive means to describe and predict human behavior. TPB is an extension of the theory of reasoned action, comprehensively defining attitudes, subjective norms, and perceived behavioral control as the main determinants of intentions to perform a behavior (Ajzen, 1991). In the TPB model, attitude toward behavior refers to the affective evaluation of behaviors (their benefits and costs), whereas perceived behavioral control refers to one's self-efficacy to perform the behavior (Ajzen, 1991).

That is why TPB remains relevant to studying entrepreneurship, as it focuses on capturing the mental processes associated with the intent to act as an entrepreneur. Research has confirmed that ATB and EPS are strong determinants of entrepreneurial intentions and if this favorable attitude toward entrepreneurship is complemented by skills then it posts a strong likelihood to increase entrepreneurial intention (Al-Mamary et al., 2020; Rehman et al., 2023). With the help of TPB, this study will carry the objective of exploring the role of ATB and skills on intention of entrepreneurship, particularly in the context of the Pakistan IT industry, where entrepreneurial opportunities as well as threats are different.

On this theoretical background and previous literature review, the following conceptual model (Figure 1) has been developed to represent the interconnection of EPS, ATB, and intentions.

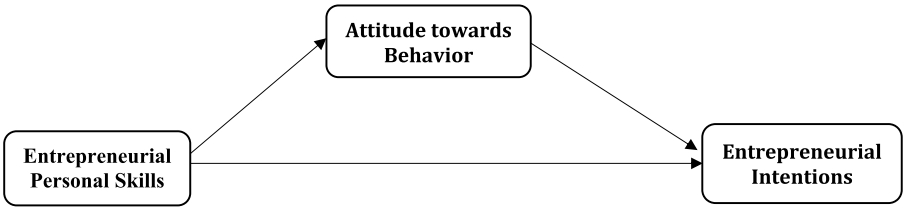

Figure 1. Conceptual model.

Methodology

Sample and data collection

This study therefore adopted a quantitative approach in data collection and analysis. Primary data were collected on the participants' feelings, thoughts, and/or views on entrepreneurship with the help of a survey questionnaire because it provides quantitative data on perceptions of subjects on entrepreneurial intentions as recommended by Fisher (2010). The target population comprised IT professionals who works in listed IT firms in Pakistan. Here, the study adopted a cross-sectional research strategy and assessed the data quantitatively.

Consequently, the following is a justification for choosing the sample as IT professionals for this study. First, the IT sector in Pakistan is one of the fastest-growing industries, with large numbers of employees compared to other sectors. Across the world, IT has been considered to be a major contributor toward economic development, with the number of workers in the industry reaching more than 55 million in 2022. The IT industry forms a major component of the Pakistani economy and the demand for IT professionals has grown rapidly in the last decade or so. Because there are many types of professionals in this field, IT offers a broad and heterogeneous population to assess entrepreneurial intentions.

Second, it is worth noting that most contemporary entrepreneurial business activities of all industries are technology oriented. Because technologists spent most of their time at work engaged with new technologies, they take charge of driving technology changes within their organizations. The nature of the IT sector inherently brings employees face to face with opportunities for creativity and innovation quite often, and so the core nature of the job fits with the characteristics of an entrepreneur. Research has established that workers in technology industries are inclined toward self-employment because of close interaction with new ideas and opportunities to work from home.

Third, the IT sector in Pakistan has more index of innovativeness and entrepreneurial ventures. IT specialists implicitly work on solutions to various problems, constantly using their ability to adapt and predict possible outcomes, which are key to being an entrepreneur. This sector is one of the

fastest-growing, and it shifts focus toward innovation, which creates an excellent ground where IT employees can cultivate the entrepreneurial spirit. Therefore, these individuals are suitable candidates for the examination of motives affecting entrepreneurial intentions.

Finally, our sample covers a broad age group that represents levels of experience of IT professionals. Thus, this study guarantees a larger insight into entrepreneurial intentions across the enlisted IT employees and with the heterogeneous background and experience levels among the participants. This diversity enlightens the data and makes it possible to get insights that relate to participants that include the new entrant in the job market to the elderly experienced in that field.

Entrepreneurial intention was measured as a single dimensional construct comprising six items borrowed from Liñán (2008) and was used for its operationalization. Moreover, as a mediator, ATB was measured using a single dimensional scale following Kolvereid (1996). The ATB construct in this study corresponds to the TPB in that attitudes toward the actions of entrepreneurship influence intentions. This index comprises five items from Liñán (2008); they measure IT professionals' perceptions of entrepreneurship. In addition, EPS as an independent variable was incorporated and was represented using a single dimensional construct of 14 items as postulated by Smith et al. (2007).

Calculating the sample size, the formula used belongs to Kadam and Bhalerao (2010) and, according to it, 372 respondents would be needed in this study. Thus, the final total of the participants from two surveys equaled 376, which is appropriate for partial least squares structural equation modeling (PLS-SEM) analysis according to the suggestion of Lei and Lomax (2005). The IT firms and their employees' data were collected from the Securities and Exchange Commission of Pakistan. As for the considerable strength of our study, we recognize the limitation of generalizing our research findings to the entire population because the sample is composed of solely IT professionals due to their sector's congruence with self-employment inclinations. Future research could extend these data to larger samples with different occupations in organizations to confirm these results.

The survey questionnaires were distributed to 700 IT employees, and 398 returned questionnaires were received; out of them, 376 were valid for further analysis, which gives a usable response rate of 53.71 percent. The respondents' profiles, described in Table 1, can also be seen as quite diverse in age, experience, and background.

Table 1. Demographic characteristics of respondents.

Item	Frequency	Percent	Item	Frequency	Percent	Item	Frequency	Percent	Item	Frequency	Percent
Order of birth			**Educational background**			**Work experience**			**Sole proprietorship**	8	20
Eldest	14	35	Doctoral degree	2	5	1 year	9	22.5	Partnership	12	30
Youngest	14	35	Master's in Computer Science	10	25	2 years	4	10	Joint venture	1	2.5
Only child	2	5	Master's in Information Technology	2	5	3 years	2	5	Limited company	11	27.5
None of the above	9	22.5	Master's degree, others	7	17.5	4 years	6	15	Joint stock corporation	2	5
Father's working status			Bachelor's degree (4 years)	15	37.5	5 years or more	19	47.5	Others	5	12.5
Business	9	22.5	Diploma or equivalent	1	2.5	**Location of your company**			**Years of operation**		
Full time	10	25	Others	2	5	Rawalpindi	29	72.5	Less than 5 years	12	30
Part time	4	10	**No. of employees**			Lahore	5	12.5	6–10 years	15	37.5
Not working	7	17.5	Less than 10	4	10	Faisalabad	1	2.5	11–20 years	6	15
Deceased	10	25	11–20	14	35	Gujranwala	5	12.5	More than 20 years	5	12.5
Family history of entrepreneurship			21–50	7	17.5	**Position**			**Age**		
Parents	10	25	51–100	7	17.5	Director	3	7.5	up to 25 years	19	47.5
Sibling	3	7.5	101–150	2	5	Manager	6	15	26–30 years	9	22.5
Relatives	5	12.5	250 above	4	10	Team lead	3	7.5	31–35 years	3	7.5
None	21	52.5	**Ownership**			Developer	19	47.5	36–40 years	3	7.5
Gender			51–55 years	1	2.5	Others	7	17.5	41–45 years	3	7.5
Male	28	70	56–60 years	1	2.5						
Female	12	30									

Results and discussion

Therefore, this study used SEM with a PLS approach to examine the proposed relationship between the antecedents of EPS, ATB, and entrepreneurial intention. The following results are discussed and analyzed in this section according to the guidelines of the theoretical framework and avail themselves of the related literature.

Data analysis and model evaluation

An analysis of the reliability and validity of the measurement model was conducted. The values of Cronbach's alpha and composite reliability of all the constructs were above 0.7, which proved the internal consistency. Table 2 average variance extracted (AVE) values were more than 0.5, thereby confirming the convergent validity of the study and reflecting the findings of Fornell and Larcker (1981). Discriminant validity was assured in this study in that the AVE square root for each of the constructs was higher than coefficients representing the correlations between a given construct with the other constructs, as seen in Table 2 and Table 3.

Table 2. Items loading and measures of internal consistency.

Constructs	Items	Loadings	Cronbach's alpha	Composite reliability	AVE
Attitude toward behavior	Q.01ATB	0.76	0.91	0.93	0.74
	Q.02ATB	0.88			
	Q.03ATB	0.86			
	Q.04ATB	0.91			
	Q.05ATB	0.87			
Entrepreneurial intentions	Q.01EI	0.86	0.95	0.95	0.69
	Q.02EI	0.86			
	Q.03EI	0.84			
	Q.04EI	0.88			
	Q.05EI	0.85			
	Q.06EI	0.86			
Entrepreneurial personal skills	Q.01ES	0.83	0.95	0.95	0.71
	Q.02ES	0.85			
	Q.03ES	0.84			
	Q.04ES	0.87			
	Q.05ES	0.88			
	Q.06ES	0.91			
	Q.07ES	0.86			
	Q.08ES	0.87			
	Q.09ES	0.84			
	Q.10ES	0.84			
	Q.11ES	0.81			
	Q.12ES	0.80			
	Q.13ES	0.82			
	Q.14ES	0.79			

Table 3. Discriminant validity.

	ATB	EPS	Ent-Int
Attitude toward behavior	**0.86**		
Entrepreneurial skills	0.59	**0.84**	
Entrepreneurial intentions	0.59	0.57	**0.83**

Hypothesis testing and interpretation

The explanatory relevance of the structural model was assessed using path coefficients, coefficient of determination (R^2), measure of effect size (f^2), and measure of predictive relevance (Q^2), as provided by Hair et al. (2013). The following sections also discuss the implications of each hypothesis in the light of literature.

Hypothesis 1 (H1): ATB positively influences entrepreneurial intentions

It was found that ATB had a positive influence on entrepreneurial intention ($\beta = 0.426$, $t = 7.267$, $p < .000$), therefore supporting H1. This finding supports TPB because ATB is one of the key predictors of intention (Ajzen, 1991). A positive attitude toward entrepreneurship tends to capture the total anticipated gains from self-employment and entrepreneurial activities combine with control, creative work, and economic incentives (Krueger et al., 2000). This finding also supports Liñán and Chen (2009), who said that those with a positive attitude toward entrepreneurship will likely engage in entrepreneurship. Finally, in the context of IT professionals, where creativity and new ideas are appreciated, these attitudes probably enhance the desire to explore entrepreneurial opportunities.

Hypothesis 2 (H2): EPS influence ATB

According to H2, EPS would have a positive relationship with ATB. This fact has also been reflected in the results, so H2 was supported as well ($\beta = 0.593$, $t = 10{,}195$, $p < .000$). This finding is in line with Fayolle and Gailly (2015) and Shapero and Sokol (1982), reasoning that bearing EPS makes one confident in their skills and, therefore, they develop a more positive attitude toward entrepreneurship. Chell (2013) could not agree more with this perspective when he postulated that skills in opportunities identification, risk management, and resource mobilization enhances confidence toward entrepreneurial actions with a positive attitude. Especially when broken down by sector, it becomes clear that where occupational skill requirements are rapidly changing (as in the case of the IT sector), possessing relevant EPS helps an individual to gain a better perception of their preparedness/fitness to engage in entrepreneurial activity within that particular sector.

Hypothesis 3 (H3): EPS influence entrepreneurial intentions

The result also confirmed H3, which proposed a direct and positive relationship between entrepreneurial skill and entrepreneurial intention ($\beta = 0.340$, $t = 5.476$, $p < .000$). This operationalization adds to the literature in emphasizing the role of exposure to skills in determining intentions to engage in entrepreneurship. Other previous works (for example, Rauch & Frese, 2007) present the argument

that e-skills are fundamental antecedents of intentions toward entrepreneurship because they prepare a person in case of any challenges in the business ventures. The findings also indicate that the perception of the environment as one of rapid technological change full of opportunities for innovative work helps explain why possessing EPS may act to enhance the probability of an IT professional participating in entrepreneurial activities. This is also compatible with the theory of perceived behavioral control within TPB's assertion that self-efficacy and competency in skills help develop intention (Bandura & Wessels, 1997).

Hypothesis 4 (H4): ATB mediates the relationship between EPS and entrepreneurial intentions

As stated in H4, the results showed that ATB fully mediates the link between EPS and entrepreneurial intentions ($\beta = 0.253$, $t = 6.169$, $p < .000$). This research evidence implies that, although the skills influence intentions to become entrepreneurs, the influence of skills is conditioned by positive attitudes to entrepreneurship. Argued that attitude works as a lens whereby individuals make sense of their skills and determine whether or not to act on them. For example, an IT professional has a high level of EPS and this person may opt for entrepreneurship if they also have a perception that shows entrepreneurship as a fulfilling and valued career. Thus, via the mediating role of ATB, it is possible to emphasize that enhancing positive attitudes toward entrepreneurship is critical to achieving a transition from skill development to entrepreneurially activated sectors, such as IT (Table 4).

Additional Model Assessment Metrics

- *Coefficient of determination* (R^2): The findings indicated that EPS accounted for 32 percent of the total variance in ATB ($R^2 = 0.32$), and ATB and skills accounted for 46.6 percent of the total variance of entrepreneurial intentions ($R^2 = 0.466$). This substantial explanatory power has a close accord with the TPB framework, as the theory posits that perceived capabilities and attitude have a direct influence on intention (Ajzen, 1991).
- *Effect size* (f^2): The foreclosure coefficients of EPS were moderate for ATB, with $f^2 = 0.22$, and strong for entrepreneurial intentions with $f^2 = 0.54$. The findings of this study provide evidence for the assertion that the level of skill makes a huge difference in actual attitudes and intentions, as was found in an earlier study by Shane and Venkataraman (2000) (Table 5).

Table 4. Results of direct and mediating tests.

	Hypothesized path	Path coefficient	Standard error	t value	*p* value	Decision
H1	ATB → Ent-Int	0.426	0.059	7.267	.000	Supported
H2	EPS → ATB	0.593	0.058	10.195	.000	Supported
H3	EPS → Ent-Int	0.340	0.062	5.476	.000	Supported
H4	EPS → ATB → EI-Int	0.253	0.041	6.169	.000	Supported

Table 5. Effect size (f^2).

Exogenous constructs	Effect size	Total effect
EPS-EI-Int	0.54	Strong
EPS-ATB	0.22	Moderate

Table 6. Predictive relevance (Q^2).

Total	SSO	SSE	1-SSE/SSO
Attitude toward behavior	1,820.00	1,396.13	0.233
Entrepreneurial intentions	2,548.00	1,780.27	0.301

Note: SSE = Sum of Squared Errors; SSO = Sum of Squared Observations.

- *Predictive relevance* (Q^2): The Q^2 values (0.233 for ATB and 0.301 for entrepreneurial intentions) suggest that the model has significant predictive relevance, to validate its use in making future forecasts of entrepreneurial behavior in a similar environment (Henseler et al., 2009) (Table 6).

Research and practical implications

This research sheds light on techniques that can help aspiring actors bring practical insights that would help the subjects of this study and aspiring entrepreneurs, particularly in the IT field, by clarifying the factors that impact their level of entrepreneurial intentions. The present work also raises awareness about the significance of skill and attitude development as key components influencing entrepreneurial intentions. Thus, the relationship between these factors may help those thinking about becoming entrepreneurs to better understand the obstacles to new venture creation processes. It can only be stated, though, that this endeavor is not exclusively an individualistic onus: to take an example, the financial capital necessary for new venture creation is similarly crucial for the fulfillment of entrepreneurial potential. In developing countries such as Pakistan where unemployment rate has become a recent phenomenon, learning for entrepreneurship can enhance the economic stability and employment opportunities (Naudé, 2011). However, this has to be backed up with an enable environment providing tangible tools and solutions to support such businesses, especially in the fast moving, technologically driven IT industry. In practice, when practitioners are assisting people to mobilize from intention to action, they are strategically positioned to assist in developing an ecosystem that focuses not only on the individual skill set but also the architectural structures to support enterprise creation (Stam, 2015).

Theoretical implications

The theoretical implications of this study lie in its extension of TPB and in the context of entrepreneurial intentions. This research supports TPB's argument

that self-attitude is one of the powerful predictors of intention, as revealed by the impact of entrepreneurial self-effort, passion, and persistence for business intentions (Ajzen, 1991; Krueger et al., 2000). Focusing on these attitudes with regard to skills, this research indicates that attitudes are not only the antecedents but also the moderators that bridge the gap between skills and intentions based on the TPB framework's applicability to entrepreneurial context. Finally, the study supports what entrepreneurs bring about as attitudes and skills that are entailed in an entrepreneurship personality. This mindset is dynamic, which mean that, through education, experience, and proper networks this will lead to the development of entrepreneurial intentions (Fayolle & Gailly, 2015; Shane & Venkataraman 2000). Drawing on mindset development as a key stage in the creation of entrepreneurial technologies, this study underscores how and what education of formal and informal education methods engage in the formation of entrepreneurial intentions, especially in technology-related industries (Isenberg, 2010).

Policy implications

Several policy insights for development of entrepreneurial ecosystems relevant especially to IT industries are shown in this study. First of all, it is stated that further policies should be established that are able to develop skills, primarily IT skills, in the regions. To tackle this, there are ways whereby policy makers can come up with vocational training, internships, and scholarships with the intention of grooming IT experts who are ready for entrepreneurship (OECD, 2017). Because the positive attitude toward entrepreneurship has been singled out as crucial for enhancing entrepreneurial activities, policy makers should also begin launching publicity campaigns designed to familiarize people with the advantages of running their own businesses, as well as launching apprenticeship programs. Setting-up occasions that may bring young entrepreneurs in contact with experienced economic heads (Audretsch et al., 2007; Robson and Robinson, 2013). Such initiatives can cultivate favorable perception toward entrepreneurship among people within the IT industry so that more will venture into business.

Moreover, Mucheru (2019) noted that the study also recommends policies that support the improvement of the business environment in the IT industry. Application of simple registration processes, compiled taxes, and affordable loans are some measures that must be taken to enhance the friendly structure of the business environment (Stam, 2015). Government could use a policy tool such as offering concessional and/or cheaper funding in the form of tax credits, subsidies, and grants to early-stage ventures that are clearly within the IT development path. This would ease the funding constraints that early-stage IT ventures face. Third, the study concludes with the fact of the current gender gap in IT, and thus calls for policies that focus on gender inclusion in

the IT industry. Thus, governments can encourage gender diversity by supporting women's scholarships, revealing new training programs and useful mentorship for IT women's opportunities, and increasing women's equity to entrepreneurial chances (Naudé, 2011; OECD, 2017). Furthermore, policies do not only transform the capabilities of women but also promote the general economic improvement through proper utilization of human resources. Through these policy measures, governments can build an appropriate environment that responds to the actual shortcomings of the demand for a new economy that can improve the positions of start-ups, thus enhancing the system of the entrepreneurial society (Isenberg, 2010; Shane & Venkataraman, 2000).

Limitations and future directions

However, this study has a few limitations on which future research can be based. One weakness within the research is that it is based on self-reported information and therefore could be prejudiced. The respondents could have offered biased responses due to social desirability; therefore, the results of the participants' skills, attitudes, and intentions are overestimated. It is suggested that future studies employ performance tests and behavioral observations in addition to self-reports. Still another limitation in the study was that the research was conducted in a particular region and may not apply to other regions or countries. Further research can identify the presence of the relationship between skills, attitudes, and intentions in the IT industry along with different areas and countries to see whether the results are consistent with the present study.

Further, it has focused only on skills, attitudes, and intentions and no other factors that may influence entrepreneurial behaviors have been explored, such as social pressure and availability of resources and facilities. Perhaps further study could help identify the part played by these factors in the development of entrepreneurial activity among IT personnel. Last, but not least, the research failed to investigate the interconnectivity between the variables of the study; that is, the levels of entrepreneurial behavior and performance consequences, including business success and profitability. Subsequent studies can further explore this link with a view to establishing the level of correspondence of skills, attitudes, and intentions with entrepreneurial success in the IT sector.

Conclusion and discussion

This study thus assessed the moderating role of ATB in the relationship between EPS and IT intentions of Pakistani IT professionals. The outcomes of this study indicated a positive correlation of the level of intentions toward entrepreneurship with the level of personal entrepreneurship characteristics. Thus, these emergent findings suggest that the extent of

entrepreneurial intensions of a person is contingent on the extent of the EPS that is/are inherent in the person. Further, ATB strongly impacted entrepreneurial intentions and the study also found that EPS positively impacted ATB. Additionally, the results of the PLS-SEM also revealed that the high level of high apparent attractiveness to start a venture partially mediated the relationship between entrepreneurship competencies and entrepreneurial intention. In addition, these conclusions are affirmed by previous studies that show a positive relationship between entrepreneurship competencies and entrepreneurial aspirations (Denanyoh et al., 2015; Esfandiar et al., 2019; Nabi et al., 2018; Meoli et al., 2020; Oguntimehin, 2018; Shahzad et al., 2012; Zafar et al., 2013). Therefore, based on the findings of this study, the following research recommendation is made to improve the state of affairs: Steps must be taken to improve the EPS of IT professionals. Given the fact that IT is among the leading industries across the world, IT professionals should be encouraged to develop and foster the spirit of entrepreneurship. This is especially possible because the capacity for innovation is particularly sensitive to the skill sets of the IT workforce. In addition, it is recommended that the concerned government departments of Pakistan will start programs and seminars related to EPS in IT professionals. Therefore, this article recommends that the higher education commission of Pakistan and other related organizations of higher learning establish mandatory courses on entrepreneurship and relevant skills as a way of boosting entrepreneurial capacity in Pakistan.

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No potential conflict of interest was reported by the authors(s).

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