

Intención Emprendedora Académica: un estudio a través de la Teoría del Comportamiento Planeado

Academic Entrepreneurial Intention: a study through the Theory of Planned Behavior

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Resumen

Introducción: El estudio de la intención emprendedora es primordial para entender el inicio del proceso de emprendimiento. La literatura en emprendimiento académico sustenta que existe escasez de investigaciones relacionadas con el cómo un individuo, en el entorno académico, desarrolla la intención de emprender un spin-off. Partiendo de la Teoría del Comportamiento Planeado, el objetivo del presente estudio es analizar la incidencia de los antecedentes motivacionales (actitud, norma subjetiva y control percibido) en la Intención Emprendedora Académica y examinar el efecto de los factores individuales (creatividad, utilidad percibida, autoconfianza, experiencia empresarial) y del contexto (experiencia empresarial, capacitación en emprendimiento y entorno de negocios) en dichos antecedentes.

Método: La recolección de datos fue a través de una encuesta aplicada de forma aleatoria a 172 académicos de la Universidad Autónoma de Sinaloa en diversas áreas del conocimiento (técnicas y sociales). El análisis de datos se llevó a cabo mediante la técnica multivariante Modelo de Ecuaciones Estructurales, a través del enfoque de Mínimos Cuadrados Parciales, para ello se utilizó el software Smart PLS.

Resultados: El resultado del modelo de ecuaciones estructurales evidenció que el antecedente principal de la intención emprendedora académica es la Actitud hacia el emprendimiento. Esta, a su vez, se ve influida por la Creatividad y la Utilidad Percibida.

Discusión o Conclusión: El modelo estructural de la investigación permite proporcionar evidencia predictiva de variables no observables que inciden en la formación de la intención emprendedora

en el entorno académico. Además, los hallazgos presentan implicaciones prácticas que son de utilidad a la gestión universitaria para el impulso al emprendimiento académico.

Palabras clave: emprendimiento académico; *spin-off* académico; intención emprendedora; teoría del comportamiento planeado; universidad; educación; entorno académico; emprendimiento; investigación; creatividad; experiencia empresarial

Abstract

Introduction: The study of Entrepreneurial Intention is essential to understand the beginning of the entrepreneurship process. The literature on academic entrepreneurship sustains a shortage of research related to how an individual, in the academic environment, develops the entrepreneurial intention of starting a spin-off. Starting from the Theory of Planned Behavior, the objective of the present study is to analyze the incidence of motivational antecedents (attitude, subjective norm, and perceived control) on Academic Entrepreneurial Intention and examine the effect of individual factors (creativity, perceived utility, self-confidence, business experience) and context (business experience, entrepreneurship training, and business environment) in said antecedents.

Method: The data collection was through a survey applied randomly to 172 academics from the Universidad Autónoma de Sinaloa in various areas of knowledge (technical and social). Data analysis was carried out using the multivariate Structural Equation Model technique, through the Partial Least Squares approach, for which the Smart PLS software was used.

Results: The result of the structural equation model showed that the main antecedent of the academic entrepreneurial intention is the attitude towards entrepreneurship. This, in turn, is influenced by Creativity and Perceived Utility.

Discussion or Conclusion: The research's structural model allows predictive evidence of unobservable variables that influence entrepreneurial intention's formation in the academic environment. Also, the findings present practical implications that are useful for university authorities to promote academic entrepreneurship.

Keywords: academic entrepreneurship; academic spin-off; entrepreneurial intention; theory of planned behavior; university; education; academic environment; entrepreneurship; research; creativity; business experience

Introduction

From a critical perspective of the literature on academic entrepreneurship, it sustains that the role of the scientist, academic, or researcher in the entrepreneurial process is neglected (Etzkowitz *et al.*, 2000; Goethner *et al.*, 2012; Perkmann *et al.*, 2013; Urban and Chantson, 2017; Wang *et al.*, 2021; Wright, 2014), there is a shortage of studies related to how an individual involved in the academic environment identifies the business opportunity and develops the entrepreneurial intention of starting a spin-off based on the results of their research (Guerrero *et al.*, 2016; Miranda *et al.*, 2018; Prodan and Drnovsek, 2010; Rasmussen and Wright, 2015).

In this sense, previous contributions show that the study of entrepreneurial intention (EI) is essential to understand the entrepreneurship process (Kautonen *et al.*, 2015; Kolvereid, 2016). The closest predictor of the decision to become an entrepreneur is seen in EI; the intention can foreshadow behaviors (Fini *et al.*, 2012), indicates how intensely you prepare and how much effort you are planning to commit to carrying out an entrepreneurial behavior (Bird, 1988; Carsrud and Brannback, 2011).

According to Theory of Planned Behavior (TPB), human behavior is planned and is preceded by the intention towards that behavior. Also, TPB maintains that EI is influenced by motivational factors that include beliefs about an outcome; these factors' importance in predicting intention varies according to behaviors, situations, and population (Ajzen, 1991).

Thus, previous research has considered the TPB model as a theoretical framework, confirming the concept's application in different settings (Entrialgo and Iglesias, 2016; Liñan and Fayolle, 2015). However, specifically in the academic field, it is evident that most of the literary production related to empirical studies in which EI models are developed has been in students and, to a lesser extent, in university academics (Al-Jubari *et al.*, 2018; Feola *et al.*, 2017; Miranda *et al.*, 2017; Obschonka *et al.*, 2015).

Consequently, starting from the TPB, this study aims to analyze the incidence of motivational antecedents (Attitude, Subjective Norm, and Perceived Control) on Academic Entrepreneurial Intention (AEI) and examine the effect of individual factors and context on the antecedents of the AEI.

This article is structured as follows: the first section presents a review of the literature on TPB's motivational antecedents and the individual factors and the context that have been considered in studies of academic entrepreneurship with a theoretical foundation in EI. The second

section refers to the methodology used for data collection and analysis. Later, in section three, the study results, conclusions, and implications are discussed.

Literature Review

Theory of Planned Behavior

From a cognitive approach, the best element to predict deliberate and planned behavior is the intention, mainly when said behavior is complex, difficult to observe, or involves an unpredictable period (Ajzen and Fishbein, 1980). TPB postulates that intention predicts human behavior, where intention indicates the extent of the effort of a person who plans to perform that behavior (Ajzen, 1991). In other words, when a person decides or not to take action, they tend to have prior planning, which is to say they have an intention (Ajzen, 2002). Explaining and predicting human behavior is the central purpose of TPB development, this theory comes from the field of psychology and has had satisfactory applications in others knowledge areas such as marketing and management (Al-Mamary *et al.*, 2020) or career choice (Deprez *et al.*, 2019).

Particularly, TPB represents a framework for the study of entrepreneurship, where it is considered superior and more influential than other models of intention (Al-Jubari *et al.*, 2018; Entrialgo and Iglesias, 2016; Liñán and Fayolle, 2015), such as the business event model (Shapero and Sokol 1982) and the entrepreneurial potential model (Krueger and Brazeal 1994). TPB allows addressing the analysis of the intentions of the entrepreneurs, conditioned by the result they hope to obtain, the perceptions of the environment and the perception that the entrepreneur has of their ability to control and achieve the results of their entrepreneurial action (Liñán and Chen, 2009; Van Gelderen *et al.*, 2008; Wang *et al.*, 2020).

According to Ajzen's TPB (1991), the intention that precedes a behavior is determined by three motivational factors: 1) Attitude towards the behavior, 2) Subjective Norm, and 3) Perceived Control of the behavior. Collectively, these factors represent people's actual Control over behavior and may be preceded by the beliefs of each individual (Ajzen, 1991; Ajzen, 2011). Previous studies in entrepreneurship found that these three antecedents of the TPB explain 30-45% of the variation of intentions (Liñán and Chen, 2009).

Attitude

Attitude towards behavior refers to people's general evaluation to carry out a particular behavior; it can be positive or negative, weak, or strong, and explicit or implicit (Ajzen, 1991). A positive or favorable attitude towards a behavior, such as starting a business, is formed when perceived to have beneficial and desirable consequences. Specifically, the attitude towards entrepreneurship (AE) has shown a consistent and significant impact on EI in most of the research carried out in various contexts (Al-Jubari *et al.*, 2018; Kautonen *et al.*, 2015; Kolvereid, 2016). Considering the above, the following working hypothesis is proposed.

H1. AE significantly influences AEI.

Subjective Norm

The Subjective Norm (SN) refers to the individual's perception of how the people in their life perceive their participation or not in a particular behavior, such as starting a business. That is, SN considers the perceived support of other people –family, friends, work colleagues- valued by the individual's own motivation to fulfill the aspirations of these people (Kautonen *et al.*, 2013). In previous studies, the effect of SN on Entrepreneurial Intent has varied substantially; in general, it has been found that SN is the weakest predictor of EI (Krueger *et al.*, 2000; Liñán and Chen, 2009), but instead of excluding SN from TPB, some authors have chosen to study the effects of SN on Attitude towards Entrepreneurship and Perceived Control (Liñán *et al.*, 2011; Lortie and Castogiovanni, 2015; Urban and Chantson, 2017). Therefore, the following hypothesis is stated:

H2: SN significantly influences AEI.

H2a: SN significantly influences AE.

H2b: SN significantly influences PC.

Perceived Control of Behavior

Perceived Control (PC) refers to the ability perceived by the individual to perform some behavior; it relates to the resources and opportunities available to a person, which to some degree, should dictate the probability of achievement in behavior (Ajzen, 1991). According to TPB, perceived control influences behavior directly or indirectly through intention. Various studies have found that PC is positively related to entrepreneurial intention, specifically in the academic environment; it allows overcoming the perception of financial and technological uncertainty (Feola *et al.*, 2017;

Fernández Pérez *et al.*, 2015; Obschonka *et al.*, 2015). Therefore, the following research hypothesis is proposed:

H3: PC significantly influences AEI.

Individual and Context Factors as Precedents of TPB

The literature emphasizes that academic entrepreneurial intention is a multilevel phenomenon, determined by contextual and individual factors. Specifically, articles have been published based on some intention models, and they also consider different antecedents that determine the AEI. Thus, for example, about individual characteristics and AEI, some studies consider scientific production (Goel *et al.*, 2015; Prodan and Drnovsek, 2010) and creativity (Jain *et al.*, 2009; Miranda *et al.*, 2017; Zampetakis *et al.*, 2009) as factors that determine the attitude towards entrepreneurship. Regarding context factors, the academic researcher's experience in the productive sector (Erikson *et al.*, 2015; Moog *et al.*, 2015; Miranda *et al.*, 2017; Prodan and Drnovsek, 2010), the family environment (Foo *et al.*, 2016), social and business networks (Fernández-Pérez *et al.*, 2015), the triple helix (Feola *et al.*, 2017), institutional and organizational barriers (Erikson *et al.*, 2015; Guerrero and Urbano, 2014; Huyghe and Knockaert, 2015; Urban and Chantson, 2017) significantly affect the AEI.

Starting from the TPB and according to the gaps opened by previous studies, to continue analyzing the EI through a combination of the academics' individual factors and the region's contextual factors (Foo *et al.*, 2016; Miranda *et al.*, 2017), the research model used in the present study is shown in **Fig. 1**, the TPB is extended considering four antecedents predictors of the AE construct: Creativity (CREA), perceived utility (UP), self-confidence (SELF), and business experience (BE), as well as three antecedents of the PC: business experience (BE), entrepreneurship training (ET) and business environment (ENV).

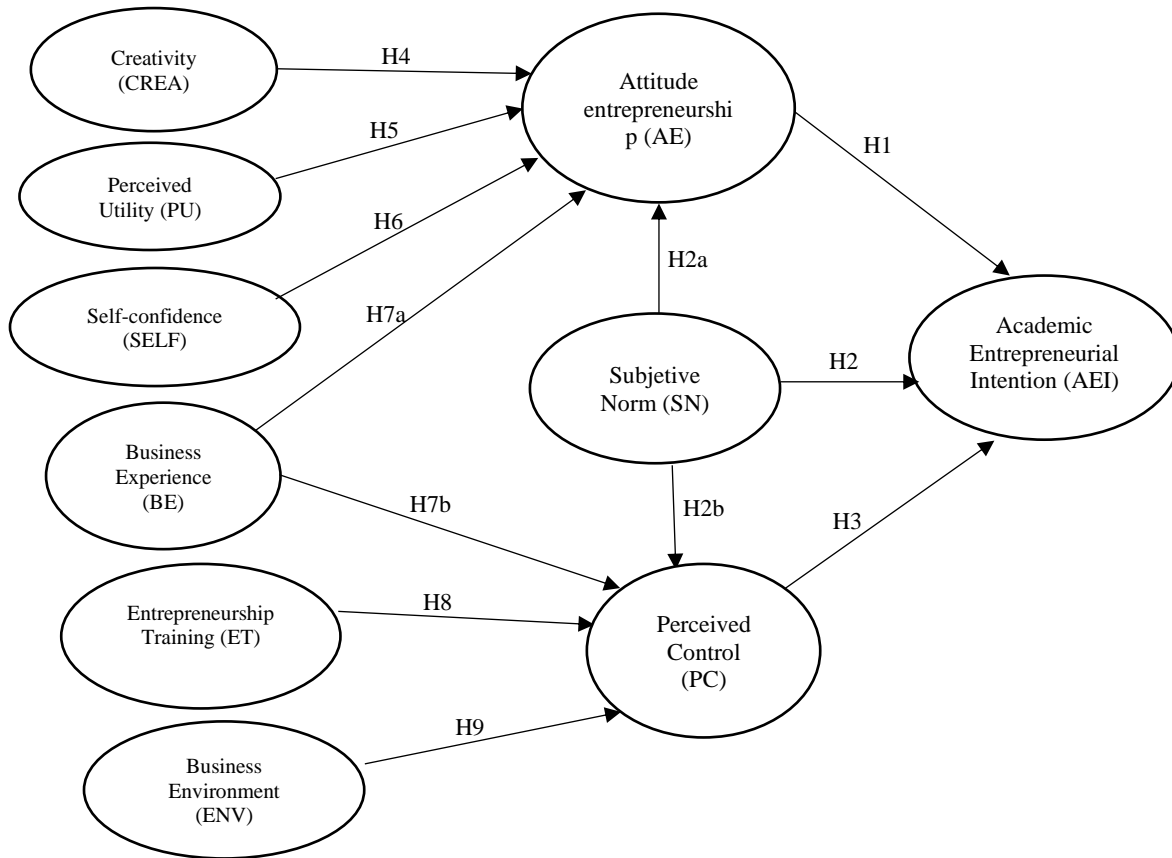


Fig. 1. Research Model.

Creativity (CREA). It is an important component of individual cognitive processing, can be defined as a personality trait that implies a willingness to pursue decisions or courses of action in a new way, even when it entails uncertainty regarding the results of success or failure (Batool *et al.*, 2015). In the field of entrepreneurship, CREA at an individual level refers to the key element at the beginning of the entrepreneurial process in which entrepreneurs can combine existing resources, generate new ideas to start innovative businesses (Hu *et al.*, 2018) or exploitation of business opportunities (Zampetakis *et al.*, 2011), that is to say, they have the ability of matching information and knowledge to create new and valuable ideas (Shahab *et al.*, 2018; Zhang and Zhang, 2018). The results of several studies are not conclusive on CREA and EI in the academic context. Shi *et al.* (2020) sustain that people with high CREA can maintain a positive attitude and high self-confidence in entrepreneurial activities, and Miranda *et al.* (2017) argue that there is no direct relationship between CREA and intention and propose an indirect connection through AE. Therefore, we posit the following hypothesis:

H4: CREA significantly influences AE.

Perceived Utility (PU). According to Miranda *et al.* (2017), previous studies related to entrepreneurship have offered models of expected utility to describe the factors that influence an individual's choice to pursue a business career. The perception of economic benefits and the amount of work effort anticipated to achieve them are important factors when deciding to become an entrepreneur (Wu and Li, 2011). Against this background, the following hypothesis is:

H5: PU significantly influences AE.

Self-confidence (SELF). According to Ferreira *et al.* (2012), self-confidence (SELF) is identified as one of the main antecedents of AE. Margahana (2019) argues that self-confidence allows convincing others and improves individual motivation to achieve established goals. Specifically, in the academic field, Miranda *et al.* (2017) suggests a direct relationship between SELF and the attitude towards entrepreneurship. Consequently, the following hypothesis is:

H6: SELF significantly influences AE.

Business experience (BE). Several prior studies emphasized individual attributes, acquired from education and industrial experience, are the most significant determinants in promoting academic entrepreneurship activities (Wang *et al.*, 2020; Wang *et al.*, 2021). Academics with less experience in the industry find it difficult to identify opportunities for commercialization of their research results (Perkmann *et al.*, 2013). In contrast, individuals who have had previous contact, through their family or professionally, in the business sector have a positive perception of carrying out entrepreneurial initiatives (D'Este and Perkmann, 2011; Prodan and Drnovsek, 2010). Miranda *et al.* (2017) argues that the previous experience of academics with the business sector through patents, collaborative research projects/contracts, and networks have a direct influence on their Attitude towards entrepreneurship (AE) and Perceived Control (PC). Therefore, we posit the following hypothesis:

H7a: Academic BE significantly influences AE.

H7b: Academic BE significantly influences PC.

Entrepreneurship Training (ET). Training and contact with entities that provide support to entrepreneurs tend to favor the willingness to start a business (Miranda *et al.*, 2017). Previous studies show that the ET directly affects the PC because it allows access to entrepreneurs' resources

and networks (Rauch and Hulsink, 2015). For their part, Rasmussen, and Wright (2015) acknowledge that many academics lack the necessary skills to start a business since those skills are very different from those they use in their academic life. There is little evidence of ET's impact on the likelihood that academics will engage in entrepreneurship (Miranda *et al.*, 2017). Against this background, the following research hypothesis is proposed:

H8: The academic's ET significantly influences PC.

Business Environment (ENV). Various studies emphasize the importance of government policies to support business activities in the region (incubators, science parks, economic incentives, among others) and, particularly, government support mechanisms to encourage university academic entrepreneurship, for example, seed capital for the spin-off (Davey *et al.*, 2016; Fini and Toschi, 2015; Foo *et al.*, 2016; Mustar and Wright, 2010). According to Miranda *et al.* (2017), the business environment significantly affects the PC of academics in the process of creating a company. Therefore, the following hypothesis is raised:

H9: ENV significantly influences the PC of academics.

Methodology

Sample and data collection

For the fulfillment of the purpose of this research, to analyze the incidence of motivational antecedents in the Academic Entrepreneurial Intention and the effect of individual factors and the context on that antecedents, an empirical study was carried out at the Universidad Autónoma de Sinaloa (UAS), located in northwestern Mexico, an educational institution that has considered in its Institutional Development Plan (2017-2021) the interest in generating technology-based companies through starting from the research results by academics and higher education students, to multiply the link and technology transfer.

The random sample was made up of university academics from various faculties of technical and social areas. It was surveyed in November 2019, distributed in person among academics, or thru an online format. Concentrating a total of 172 responses obtained. **Table 1** summarizes the sociodemographic characteristics of the respondents.

It should be noted that the sample size is appropriate for the study; it is above the specific requirements for the analysis using the modeling of structural equations for latent variables used in this research¹.

Table 1. Demographic characteristics of the sample.

n		172
Age	Min	28
	Max	67
	Mean	41.6
	Standard Deviation	8.9
Gender	Male	108 (62.8%)
	Female	64 (37.2%)
Research Experience	Yes	96 (55.8%)
	No	76 (44.2%)
Knowledge Area	Physics-Mathematics	21 (12.2%)
	Biotechnology & Agriculture	52 (30.2%)
	Chemistry-biology	21 (12.2%)
	Medicine	7 (4.1%)
	Engineering	34 (19.8%)
	Social Science	37 (21.5%)

Variables

Previous studies related to entrepreneurial intention suggest the importance of considering how motivational, individual, and contextual factors influence intention formation (Antonieli *et al.*, 2016; Knockaert *et al.*, 2015). Thus, after analyzing contributions in the literature review to identify how the variables that comply with content validity have been measured, the scale of Miranda *et al.* (2017) was selected, which consists of 47 items obtained from previous studies.

The structure of items with the variables considered is as follow: Academic Entrepreneurial Intention (4), Attitude towards Entrepreneurship (4), Subjective Norm (4), Perceived Control (8), Creativity (5), Perceived Utility (5), Self-confidence (5), Business Experience (2),

¹ The minimum sample size should be the result of multiplying by 10 the maximum number of arrows pointing to a latent variable anywhere in the nomogram (Hair *et al.* 2016). Furthermore, the authors Hair *et al.* (2019) suggest that the sample size is determined from the use of the statistical program G * Power to carry out a statistical power analysis for different configurations of the model. Both requirements were fulfilled.

Entrepreneurship Training (4) and Business Environment (6). The scale was measured on a 7-point Likert-type scale, which assesses the degree of agreement for each of the item statements: total disagrees (1) totally agree (7).

Data analysis

Data analysis was carried out using the multivariate Structural Equation Model technique, through the Partial Least Squares approach (PLS-SEM), mainly due to the following reasons:

- 1) It is oriented to the prediction of unobservable variables (latent variables)
- 2) The proposed theoretical model is complex
- 3) Large number of different latent variables, but with multiple or cross-dependence, can combine reflective and formative measures.

Therefore, the research model is analyzed and interpreted with the PLS-SEM approach, following Hair *et al.* (2019):

- 1) Evaluation of the measurement model, with reflective indicators, each item's individual reliability is analyzed, through factor loadings, scale reliability or internal consistency, convergent validity, and discriminant validity of the constructs.
- 2) Evaluation of the structural model to assess the direct effect of the exogenous latent variables on the endogenous latent variables. When evaluating the structural model, the relationships between the constructs are considered, estimating the parameters in a way that maximizes the explained variance of the latent or endogenous variables. The criteria to evaluate the structural model were as follows: the variance of the construct (R^2) was obtained², the predictive relevance of the model is validated through the Stone-Geisser Test (Q^2), the percentage of explained variance is obtained as the product of the coefficient path and the correlation coefficient, and finally, the effect size (f^2) of each exogenous variable in the endogenous construct is measured.

Subsequently, bootstrapping (5000 subsamples) is used to generate t statistics and confidence intervals, which evaluates the statistical importance of the direct effects of the structural model that allows determining the non-rejection of the hypotheses raised.

The model was estimated using SmartPLS 3.0 software (Ringer *et al.*, 2015). For the significance of the parameters, a value of $p < 0.05$ was considered, as it is the value that most researchers choose (Hair *et al.*, 2016).

² Adjusted R^2 is considered as a criterion to avoid bias in the research model (Hair *et al.*, 2019).

Results

Measurement model

The evaluation of the measurement model for reliability and validity for reflective indicators, considered the individual reliability adequate because all the indicators had loads greater than 0.706, with the exception of nine items that were subsequently excluded (see **Table 2** for the final list). Cronbach's Alpha for each construct lay between 0.696 and 0.907, indicative of good reliability and all the constructs comply with the composite reliability greater than 0.70. To assess convergent validity, the average variance extracted (AVE) was examined; all latent variables reach a value higher than 0.50.

Table 2. Measurement model evaluation.

Construct/ítem	Loadings	Cronbach's Alpha	Composite Reliability	AVE
Academic Entrepreneurial Intention (AEI)		0.772	0.867	0.686
I am determined to create a business in the future	0.885			
I intend to commercialize the results of my research a spin-off	0.822			
I would very much like to be an entrepreneur	0.773			
Attitude toward Entrepreneurship (AE)		0.841	0.894	0.68
I find the idea of being an entrepreneur attractive	0.853			
Given the opportunity and resources, I would like to create a spin-off business	0.888			
Being an entrepreneur would generate in me a feeling of great satisfaction	0.825			
I think if I decide to start a spin-off business then it would succeed	0.724			
Subjective Norm (SN)		0.798	0.868	0.622
My family would support me in my career as an entrepreneur	0.739			
My friends see entrepreneurship as a logical option	0.832			
The culture of my region encourages entrepreneurship	0.791			
Most people in my region see entrepreneurship as very positive	0.789			
Perceived Control (PC)		0.907	0.926	0.642
Recognize a business opportunity before others do	0.752			
Make improvements to certain existing products on the market	0.782			
Conduct market research for a new product	0.793			
Design a marketing campaign for my products	0.818			
Organize and maintain my business's financial information	0.794			
Manage relationships with my employees	0.847			
Develop a strategic plan	0.818			
Creativity (CREA)		0.739	0.879	0.784
I consider myself a very creative person	0.828			
I like to start new projects, despite the risk of being wrong	0.940			

Perceived Utility (PU)		0.753	0.857	0.667
Being an entrepreneur would entail a very high degree of autonomy	0.787			
The personal satisfaction from being an entrepreneur would be very high	0.881			
The quality of life that I would get from being an entrepreneur would be very high	0.779			
Self-confidence (SELF)		0.753	0.858	0.669
Whether or not a target is reached depends mainly on me and my behavior	0.759			
When I make plans, I am sure that they will come to fruition	0.853			
Achieving what I want is the result of my own effort and personal commitment	0.839			
Business Experience (BE)		0.696	0.831	0.712
I have work experience in the private sector	0.860			
I have experience as proprietor of another firm or other firms	0.826			
Entrepreneurship Training (ET)		0.867	0.908	0.712
The hours of training in entrepreneurship I received during my university studies were adequate	0.823			
The hours of training in entrepreneurship I have received as part of my university's teaching and research staff training programs have been sufficient	0.902			
The hours of training in entrepreneurship I have received outside the university have been sufficient	0.825			
My university gives good training to its teaching and research staff for them to develop their entrepreneurial potential	0.822			
Business Environment (ENV)		0.862	0.895	0.588
It is easy to obtain a bank loan to start a business	0.706			
It is easy to find investors for a new business	0.757			
There are enough grants and subsidies to create businesses	0.811			
There are sufficient consulting firms that can help start up a business	0.810			
The country's economic situation will improve notably in the coming years	0.769			
The conditions for entrepreneurs will improve notably in the coming years	0.745			

In regard to discriminant validity, allows us to assess that each latent variable is different from other constructs in the model. According to the Fornell-Larcker criterion, each construct's diagonal indices is the square root of the average variance extracted (AVE) and must be the highest in any column or row (**Table 3**). In addition, in **Table 4**, heterotrait-monotrait (HTMT) ratio was considered, to estimate whether the monotrait-heteromethod correlations (correlations between the indicators that measure the same construct) are greater than the heterotrait-heteromethod (correlations between the indicators that measure different constructs), there will be discriminant validity. Thus, the HTMT ratio is considered conservative at a value of 0.85, while values higher than 0.90 suggest lack of discriminant validity (Hair *et al.*, 2019). In this case, there is only one

value close to this critical point, HTMT in AEI-AE = 0.900, this is due to the high correlation between the two variables.

Table 3. Discriminant Validity. Fornell-Larcker criterion.

Variables	Mean	StDev	AE	SELF	ET	PC	CREA	BE	ENV	AEI	SN	PU
AE	5.412	1.076	0.825									
SELF	5.742	0.938	0.376*	0.818								
ET	3.225	1.444	0.189*	0.158*	0.844							
PC	4.861	1.170	0.523*	0.321*	0.367*	0.801						
CREA	5.845	0.892	0.464*	0.308*	0.221*	0.435*	0.886					
BE	3.480	1.808	0.455*	0.129	0.266*	0.368*	0.203*	0.844				
ENV	3.807	1.109	0.089	0.098	0.352*	0.265*	0.134	0.231*	0.767			
AEI	4.698	1.411	0.734*	0.272*	0.274*	0.563*	0.411*	0.378*	0.229*	0.828		
SN	5.180	1.083	0.385*	0.298*	0.412*	0.455*	0.351*	0.312*	0.317*	0.341	0.789	
PU	5.420	0.973	0.659*	0.391*	0.122	0.322*	0.233*	0.375*	0.105	0.480*	0.479*	0.817

* Denote a significant at $p < 0.05$.

Table 4. Discriminant Validity. Heterotrait-Monotrait ratio (HTMT).

	AE	SELF	ET	PC	CREA	BE	ENV	AEI	SN	PU
AE	---									
SELF	0.472									
ET	0.219	0.218								
PC	0.594	0.377	0.396							
CREA	0.57	0.411	0.286	0.529						
BE	0.640	0.265	0.359	0.495	0.303					
ENV	0.113	0.167	0.407	0.285	0.178	0.307				
AEI	0.900	0.342	0.31	0.643	0.534	0.531	0.273			
SN	0.471	0.373	0.501	0.523	0.475	0.453	0.388	0.414		
PU	0.809	0.531	0.173	0.379	0.292	0.546	0.145	0.609	0.637	

Structural model

Fig. 2 and **Table 5** show the results of the evaluation of the structural model. In general, ranges of values obtained from adjusted R^2 (0 to 1) and Q^2 (greater than 0) indicate a high predictive precision of the model proposed in this research. The variance of the Academic Entrepreneurial Intention construct explained by this model is 57.6%, of which PC contributes 13.96%, SN is not significant, and AE is the construct that most contributes to explaining the AEI with 44.61%. For the AE construct, the value of R^2 is 56.2%, mainly described by PU with 33.21%, CREA contributes 13.83%, and BE contributes 9.46%. SELF and SN do not contribute to the variance of AE.

Regarding PC, the value of the variance is 27.5%, explained in a more significant proportion by SN with 13.65%, BE with 8%, ET with 6.10%, and ENV not significant.

In particular, the bootstrap technique shows that 7 of the 12 direct effects on endogenous or independent variables are significant. Thus, AE ($\beta = 0.607$; $t = 10.03$; $p < 0.05$) and PC ($\beta = 0.248$; $t = 3.329$; $p < 0.05$) positively and significantly influence the AEI, otherwise the SN, which only shows a positive relationship and significant in the PC ($\beta = 0.30$; $t = 3.683$; $p > 0.05$). It should be noted that the values obtained from f^2 allow us to ratify that AE emerges as the most important antecedent in AEI; it has a strong and significant effect, whereas PC is significant, but with a small effect on intention and SN does not have a direct effect on the AEI.

Regarding the direct relationships of the individual factors that precede the AE construct, only PU ($\beta = 0.504$; $t = 7.434$; $p < 0.05$), CREA ($\beta = 0.298$; $t = 4.503$; $p < 0.05$) and BE ($\beta = 0.208$; $t = 3.436$; $p < 0.05$) are the significant variables with large, moderate, and small direct effect, respectively. In reference, to the contextual factors that precede the PC construct, BE ($\beta = 0.217$; $t = 2.803$; $p < 0.05$) and ET ($\beta = 0.165$; $t = 2.415$; $p < 0.05$) are significant, but with a small effect.

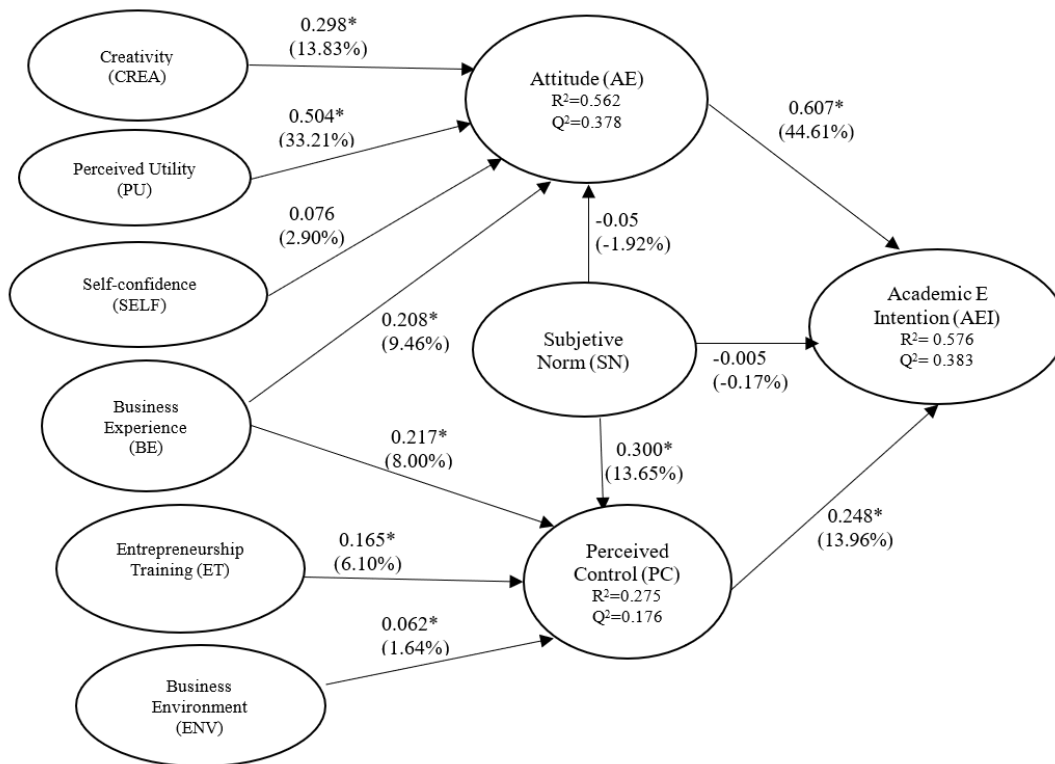


Fig. 2. Results of the structural model.

The values, in the arrows, indicate the beta coefficients and, in parentheses, the explained variance

* Denotes a significant direct effect at $p < 0.05$.

Table 5. Result of the Structure Model.

Hypothesis	Direct Effect β	t-Value	P Value	Explained Variance	f^2
H1: AE→AEI	0.607	10.03	0.000	44.61%	0.619
H2: SN→AEI	-0.005	0.092	0.927	-0.17%	0.000
H2a: SN→AE	-0.05	0.832	0.405	-1.92%	0.004
H2b: SN→PC	0.300	3.683	0.000	13.65%	0.097
H3: PC→AEI	0.248	3.329	0.001	13.96%	0.096
H4: CREA→AE	0.298	4.503	0.000	13.83%	0.172
H5: PU→AE	0.504	7.434	0.000	33.21%	0.388
H6: SELF→AE	0.076	1.29	0.197	2.90%	0.011
H7a: BE→AE	0.208	3.436	0.001	9.46%	0.084
H7b: BE→PC	0.217	2.803	0.005	8.00%	0.058
H8: ET→PC	0.165	2.415	0.016	6.10%	0.029
H9: ENV→PC	0.062	0.887	0.375	1.64%	0.004

Discussion

The structural model of the research shows a 57.6% explanation of the variance of AEI. This percentage is higher than those obtained by previous studies academic entrepreneurship between 35 and 50% (Alonso-Galicia *et al.*, 2015; Feola *et al.*, 2017; Fernández-Pérez *et al.*, 2014).

Regarding the motivational factors (AE, SN, and PC) that directly precede the AEI, the results obtained show that the AE presents a positive and significant relationship with a greater influence on the intention to become an entrepreneur. On the other hand, PC has a significant impact, but with a small effect. However, SN does not significantly affect AEI or AE; it only significantly affects PC. This agrees with previous research supports that in non-business environments such as universities, it is the characteristics of the academic, his positive attitude towards generating spin-off companies, has a more significant influence on intention, in contrast to formal factors such as institutional or organizational support measures (Guerrero *et al.*, 2016; Miranda *et al.*, 2017; Urban and Chantson, 2017).

However, regarding AE's dominant influence as an antecedent of intention, the present study's findings reveal a significant but weak relationship between PC in AEI. This contrasts with previous research, in which they find the PC not significant (Miranda *et al.*, 2017; Piperopoulos and Dimov, 2015) and with those that find that the PC is the main determinant of intentions, where AE and SN act as support (Feola *et al.*, 2017). An explanation for this result could be found in the characteristics of the sample of academic researchers, who consider that with the more significant

human capital, they could develop the skills and abilities necessary to start a business when the time comes. The PC will be more influential when initiating entrepreneurial behavior and not when the business intention is formed (Kautonen *et al.*, 2015).

Regarding the SN, that is, the perception by family, friends, and co-workers that the academic decides to become an entrepreneur, the results show that it does not directly influence the AEI, only indirectly with a small effect through the PC. This finding agrees with previous studies that support that SN tends to vary according to culture or environment (Liñan *et al.*, 2011), in Latin America and the Anglo-Saxon region, both the success or failure of business activities are viewed and judged from differently, for example, when the academic knows a colleague who has started a spin-off and has a positive experience, it will positively influence the SN and PC; otherwise, if they have had an experience of failure to become an entrepreneur, it may not negatively affect any antecedent of the intention but be significant because the individual considers that the experience, even when it was negative, has served to acquire knowledge (Passaro *et al.*, 2017; Sieger and Monsen, 2015).

Concerning the individual factors that precede AE, they are CREA, PU, and BE, which positively and significantly affect the academic attitude towards entrepreneurship. This is in line with the results obtained with Miranda *et al.* (2017), who argue that, in the academic field, it is necessary to encourage entrepreneurial activities as a mechanism to transfer technology and, to be considered together with teaching and research, with the same recognition by the educational institution.

On the other hand, the contextual factors that precede the PC are BE and ET, presenting a positive and significant direct effect. According to the theory, it sustains that the academic who has experience in the business sector, whether due to having developed a spin-off or for research reasons, had a link with the industry, will have a PC to carry out entrepreneurial activities. Besides, together with entrepreneurship training for academics and students, it will allow the development of skills that favor university spin-offs. (Bienkowska *et al.*, 2016; Perkman *et al.*, 2013; Rasmussen and Wright, 2015).

Conclusions

Starting from the Theory of Planned Behavior (TPB), the present study had as objectives: to analyze the incidence of motivational antecedents (attitude, subjective norm, and perceived

Control) on Academic Entrepreneurial Intention and to examine the effect of individual factors and context in the background of the AEI; with the idea of contributing to the open gaps of investigating the determinants of the intention to create an academic spin-off.

Thus, our research's empirical sample was made up of academics from the Universidad Autónoma de Sinaloa, a public institution that shows interest in creating science-based companies. The results obtained provide predictive evidence of unobservable variables that influence the formation of intention in the academic environment.

Based on the methodology used, PLS-SEM, the following results were obtained:

- 1) With respect to motivational antecedents in the intention, our analysis showed that the Attitude towards Entrepreneurship is the variable with the most significant influence on the formation of the Academic Entrepreneurial Intention.
- 2) In regard to the individual factors with the most significant effect on Attitude are the Perceived Utility by the academic, the perception of economic benefit, amount of anticipated work effort, among others, to achieve utility are essential factors when deciding to become an entrepreneur.
- 3) Likewise, the Creativity and the Business Experience of the academic, with a moderate and small effect, respectively, affect the attitude towards entrepreneurship.

This research contains academic implications, the proposed theoretical model allows in general, contributing to the study of Entrepreneurial Intentions and, in particular, intentions among university academics. The incorporation of new theoretical perspectives to the study of entrepreneurial intention allows to continue with the individual analysis with different approaches; for example, integrating the cognitive aspects of the TPB and the elements of the Triple Helix (government, industry, academia) can contribute to the sustenance of the determinants of the formation of the AEI. In the same way, considering theoretical approaches proven in organizational studies, such as the resource-based approach to the company or the theory of social networks, can provide excellent foundations to understand how to encourage entrepreneurial intention in the academic environment.

Regarding the practical implications of the study, due to the importance of the transfer of university technology to generate competitive advantage, economic and social development in the region, and considering the relevant role of the individual in the entrepreneurial process, it is useful

that the university authorities know the factors that allow promoting entrepreneurship activities, in particular, the creation of academic spin-offs.

In this sense, some university environment agents' support is essential, such as technology transfer offices, science, and technology parks, in the training of academics to develop their creativity and identify business opportunities in the research results, which can favor the attitude and perceived control towards entrepreneurship.

In the same direction, the empirical results show the need to promote a university culture that favors academic entrepreneurship, providing support through tangible and intangible resources. Specifically, the findings indicate that utility perceived by the academics of Universidad Autónoma de Sinaloa is a significant factor in having a positive attitude towards entrepreneurship; therefore, the university must establish specific regulations for innovation, linkage, and entrepreneurship; for example, prevention and treatment of conflict of interest between the academic and the institution, regarding the participation of royalties and incentives when participating in entrepreneurial activities, particularly in creating spin-offs.

Our study has some limitations that suggest gaps for future lines of research. Only the direct effects between the individual, contextual and motivational factors that precede the IEA have been analyzed; future studies towards identifying new relationships between the determining factors and the intention may consider the moderating effect of the academic's personal and professional characteristics. Besides, carry out a longitudinal study that allows analyzing factors that affect the link or "bridge" from entrepreneurial intention to the subsequent entrepreneurial behavior. Finally, considering results obtained can only be generalized to the sample studied, it is convenient to extend the study with a more significant number of universities that allow comparisons in different university settings, considering institutions that already have success stories in academic spin-offs with null or low academic entrepreneurship.

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