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**Academic Entrepreneurship of Mindanao State University–Iligan Institute of Technology: Determinants and Mediating Effects of Entrepreneurial Intention Antecedents**

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**Abstract**

*Universities have evolved to meet the robust demand of the knowledge-based society thereby paving the emergence of the university's third mission, particularly academic entrepreneurship. In the Philippines, studies in this research field have been very limited. Following the Theory of Planned Behavior (TPB), personal and contextual antecedents were identified together with TPB's main determinants of subjective norms (SN), entrepreneurial attitude (EA) and perceived control (PC) to measure the level of entrepreneurial intention (EI) among faculty and staff of Mindanao State University-Iligan Institute of Technology (MSU-IIT). Using a descriptive and quantitative approach, particularly a GLM mediated regression analysis, a survey was conducted among 276 respondents of MSU-IIT. Results showed that entrepreneurial attitude and perceived control in this manner were the main determinants of entrepreneurial intention while subjective norms failed to predict EI. Entrepreneurial attitude fully mediates the relationship between personal antecedents and EI. Similarly, the entrepreneurial environment fully mediates the relationship between contextual antecedents and EI while entrepreneurial training predicted EI alone and not as an antecedent of PC; meanwhile, the prior business experience did not elicit significant relationship with EI even when mediated by perceived control. Moreover, ethnicity moderates the effect of personal antecedents towards entrepreneurial intention thereby opening future researches regarding the effects of ethnicity and other Filipino entrepreneurial attitudes to localize the understanding of entrepreneurial intention in the Philippine academic setting.*

**Keywords:** *Philippine academic entrepreneurship, entrepreneurial intention, theory of planned behavior, entrepreneurial antecedents mediating effects*

**Introduction**

In more recent years, the emergence of a much modern society has prompted knowledge to transition as an essential component in the production and development of the society, which is known to be as knowledge society (Audretsch, 2014; Etzkowitz, 2013) and within the spectrum of this new society, universities have also transitioned to newer missions in promoting economic and social development while preserving sustainability (Schmitz, Urbano, Dandolini, de Souza, & Guerrero, 2017). These newer missions pushed universities to engage and collaborate with the industry and governments (also known as the triple helix of innovation) to advance socio-economic goals (Etzkowitz, Webster, Gebhardt, & Cantisano Terra, 2000). This resulted to the changes in the mandate, function and even structure of the universities (Goldstein, 2010), which took form in innovation and entrepreneurship activities (Abreu & Grinevich, 2013) which have become an essential catalyst for the transfer of university knowledge and technology from university laboratories to the commercial markets (Jain, George, & Maltarich, 2009). These organized entrepreneurial activities such as patenting,

licensing, startup creation, and university-industry partnerships were then collectively called ‘academic entrepreneurship’ since the main goal is to commercialize innovations developed by academic scientists (Siegel & Wright, 2015). In the Philippines, academic entrepreneurship, in its essence, took form as income-generating projects (IGPs) initiated to mainly augment operating expenses or finance projects. The Philippine Technology Transfer Act of 2009 was enacted to provide a framework and support system and prioritize research and development, invention, innovation, and in the generation, transfer, and utilization of intellectual property, especially for the benefit of the general public (Philippine Technology Transfer Act, 2009). Meanwhile, the Commission on Higher Education (CHED) Memorandum Order 52 series of 2016 and under RA 7722 otherwise known as the “Higher Education Act of 1994” explicitly articulated the need to enable Philippine higher education institutions (HEIs) to optimally participate in national transformation through the production and transfer of knowledge as the country enters a rapid era of the knowledge-based global economy (CHED, 2016). Unfortunately, in a report released by the United States Agency for International Development (USAID) Philippine Science, Technology, Research, and Innovation for Development (STRIDE), the Philippines has a low level of innovation (USAID/Philippines, 2017) as cited in the 2016 Global Innovation Index, in which the country ranked number 74 out of 128 economies. This has prompted the Philippine government to work and an implement innovation-related agenda for various stakeholders including students, entrepreneurs, and employees incorporated in the Philippine Development Plan 2017-2022, which aims to enable inclusive and sustainable growth via innovation and entrepreneurship, the long-term goal of *Ambisyon Natin 2040*, and the recent passage of the Philippine Innovation Act of 2019. With all these robust demands to equip institutions in coping with the seemingly rapid demands of a global knowledge-based society, the challenge now has been thrown in the backyards of Philippine universities to engage in productivity. Mainstreaming innovation and entrepreneurship would equate to major structural changes in the academic community, most particularly among state universities and colleges (SUCs) in the Philippines (Cadiz, 2012).

The Mindanao State University – Iligan Institute of Technology (MSU-IIT) positively responded by redirecting its strategic goal to become a research university and eventually an entrepreneurial university as stipulated in the vision commitment of providing holistic development of the individual and the society. MSU-IIT is one of the eleven (11) campuses of the Mindanao State University System located in Iligan City, Northern Mindanao, Philippines. The robust demands prompted MSU-IIT to restructure the Knowledge and Technology Transfer Office (KTTO) with the primary function of strengthening and facilitating the Technology Application and Promotion Unit, Intellectual Property Unit, and the Innovation and Technology Support Office (“Intellectual Property Unit/Innovation and Technology Support Office (IPU-ITSO) | MSU-Iligan Institute of Technology,” n.d.). MSU-IIT was also included in the Department of Science and Technology’s (DOST) Higher Education Institution Readiness for Innovation and Technopreneurship (HeIRIT) Development Program which funded Technology Business Incubators (TBIs) in the country, which was also congruent to the recommendation of Umali (1997) research on Philippine academic entrepreneurship. iDEYA: Center of Innovation and Technopreneurship, the university’s own TBI was established in 2015. DTI has also set up a shared service facility inside the university, the FabLab (Fabrication Laboratory), and Negosyo Center, which were the first of its kind in Mindanao. This innovation and entrepreneurship infrastructure was aimed to complement other innovation units of the Office of the Vice-Chancellor for Research and Extension (OVCRE) to increase productivity. These units and research centers include the Premier Research Institute for Science and Mathematics (PRISM), the Tuklas Lunas Center, the country’s first drug discovery and development program initiated by the Philippine Council for Health and

Research Development of DOST (“MSU-IIT Tuklas Lunas Center -- the country’s first,” n.d.), the Bamboo Technology and Resource Center (BTRC), and the Ceramics Training Center (CTC). To incentivize productivity, MSU-IIT implemented four (4) BOR resolutions: the MSU-IIT Scheme of Awards to Inventors and Incentives to Patent Agents (BOR no. 21, s. 2016), MSU-IIT Research and Dissemination Award (BOR no. 46, s. 2019), MSU-IIT Research and Extension Equivalence (BOR no. 295, s. 2019), MSU-IIT Advancing Technology Commercialization Program (BOR no. 296, s. 2019). These university policies, which cover both faculty and staff, ranging from de-loading support to financial assistance. With all the available innovation and entrepreneurship support mechanisms in place, unfortunately, MSU-IIT has only produced one (1) approved patent and three (3) other pending patent applications. How can MSU-IIT faculty and staff maximize this opportunity and seriously consider academic entrepreneurship and increase productivity? It is given that faculty and staff are key players in the research commercialization process, but their involvement in the entire academic entrepreneurship process needs deeper exploration (Agrawal, 2001).

### **Framework**

Following the Theory of Planned Behavior (TPB) of Ajzen (1991; 2011) adapted from the works of (Miranda, Chamorro-Mera, & Rubio, 2017), using inclusive, bottom-up approach in understanding entrepreneurial behavior in the academic setting (Philpott, Dooley, O’Reilly, & Lupton, 2011), this paper aims to measure the level of entrepreneurial intention among MSU-IIT faculty and staff. Particularly, this paper will provide a greater understanding of the intention to become an academic entrepreneur by investigating the influence of personal and contextual antecedents on intention and its mediating effects. The faculty are key players in the research commercialization process (Agrawal, 2001) and therefore the success of the academic entrepreneurship depends mainly on the participation of the members of the academic community (Siegel, Thursby, Thursby, & Ziedonis, 2001). According to Bird (1988), the most proximal indicator of becoming an entrepreneur is the intention, it is, therefore, the objective of this study to identify determinants of intention and highlight the mediating effects of attitude between its antecedents and intention as well as the mediating effects of perceived control between its contextual antecedents and the intention.

### ***Creativity (CREA) and Entrepreneurial Attitude (EA)***

A lot of researches has explored the possible effects of creativity towards economic exploitation (Ward, 2004; Zampetakis, Gotsi, Andriopoulos, & Moustakis, 2011 as cited by Miranda et al., 2017) and have confirmed that individual’s creativity is an important trait of entrepreneurship. However, this personal antecedent is not yet fully explored although several studies have already validated the positive relationship of creativity to business ventures (Zampetakis et al., 2011; Zampetakis et al., 2009; Zampetakis & Moustakis, 2006 as cited by Miranda et al., 2017). With this, the following hypothesis is proposed:

***H1a:*** CREA positively influences academics’ EI through EA

### ***Perceived Utility (PU) and Entrepreneurial Attitude (EA)***

Another personal antecedent considered are those factors related to expectancy type and subjective expected-utility-type that might affect individuals’ choice to pursue entrepreneurship (Gatewood, Shaver, Powers, & Gartner, 2002; Shepherd & Douglas, 2000 as cited by Miranda et al., 2017). Douglas and Shepherd (2000) revealed that pursuing

entrepreneurship is based on a person's utility function or expected benefits, one can get from the engagement. This reflects perceptions about the income anticipated, the amount of work effort anticipated to achieve this income, the risk involved, plus other factors such as the person's attitudes to the desire for independence and perceptions of the anticipated work environment. With this, this study proposed the following hypothesis:

**H1b:** PU positively influences academics' EI through EA

***Self-confidence (SELF) and Entrepreneurial Attitude (EA)***

Entrepreneurship literature also revealed that self-confidence is one of the main antecedents of the entrepreneurial attitude (Ferreira, Raposo, Rodrigues, Dinis, & do Paço, 2012 as cited by Miranda et al., 2017). In the study of Bénabou & Tirole (2014), they highlighted that this self-confidence makes it easier to convince others and improves individual motivation so that people keep making an effort until the established goals are achieved. However, in the recent work of Miranda et al. (2017), self-confidence does not influence entrepreneurial attitude. Hence,

**H1c:** SELF positively influences academics' EI through EA

***Prior Business Experience (PBE) and Perceived Control (PC)***

Business experience has been identified as an important antecedent of the success of entrepreneurship. This experience is essential in identifying opportunities for commercialization and bridging the gap between scientific research and industry networks (Mosey & Wright, 2007 as cited by Miranda et al., 2017). Moreover, individuals with sufficient business experience show a positive perception of themselves when launching entrepreneurial initiatives (Carr & Sequeira, 2007 as cited by Miranda et al., 2017). In the academic field, previous experience of academics with the business sector has a direct influence on their intention (Ding & Choi, 2011; Miranda et al., 2017). Hence, this paper posits the following:

**H2a:** PBE positively influences academics' EI through PC

***Entrepreneurial Training (ET) and Perceived Control (PC)***

Entrepreneurial training favors academics' willingness to start a business (Siegel & Phan, 2005). Similarly, entrepreneurial training directly affects entrepreneurship by allowing access to resources that facilitate the entrepreneur's work and access to the experience of other entrepreneurs (Rauch, 2014). There is, however, little evidence for any impact of training on the likelihood of academics engaging in entrepreneurship (Siegel & Phan, 2005). Thus, the following hypothesis is proposed:

**H2b:** ET positively influences academics' EI through PC

***Entrepreneurial Environment (EE) and Perceived Control (PC)***

Entrepreneurial activities can be facilitated with the favorability of the business environment. Many studies have revealed that government policies, characteristics of local business context and more specifically university support mechanisms have spurred these entrepreneurial activities (Fini, Grimaldi, Marzocchi, & Sobrero, 2012; Foo, Knockaert, Chan,

& Erikson, 2016; Goel, Göktepe-Hultén, & Ram, 2015; Knockaert, Foo, Erikson, & Cools, 2015; Moog, Werner, Houweling, & Backes-Gellner, 2015 as cited by Miranda et al., 2017). Thus,

**H2c:** EE positively influences academics' EI through PC

***Subjective Norms (SN) and Entrepreneurial Intention (EI)***

Ajzen (1991) defined it as an individuals' social influence or pressure regarding an intention or behavior, in which individuals must consider the approval (or disapproval) of close relations such as family, peers and culture regarding starting a business (Liñán & Chen, 2009; Shinnar, Giacomini, & Janssen, 2012 as cited by Miranda et al., 2017). In the area of entrepreneurship, however, subjective norms are traditionally weak in TPB and this alleged weakness is not clear (Liñán & Chen, 2009). Previous studies have revealed inconsistent SN results. In Schlaegel & Koenig (2014), they have indicated that SN is the most important factor in explaining EIs while other studies have not found SN to be a significant predictor (Autio, H. Keeley, Klofsten, G. C. Parker, & Hay, 2001; Krueger, Reilly, & Carsrud, 2000; Marques, Ferreira, Gomes, & Rodrigues, 2012 as cited in Miranda et al., 2017). However, in this paper it is imperative to assume that SN does influence EI, therefore:

**H3:** SN positively influence academics' EI

***Mediating Effect of Entrepreneurial Attitude (EA) on Personal Antecedents and Entrepreneurial Intention (EI)***

Liñán & Chen (2009) explained EA as preferences and advantages (or disadvantages) of entrepreneurship, while others have pointed it as an attitude toward becoming an entrepreneur (Maes, Leroy, & Sels, 2014). Previous studies have confirmed also that the EA is the most influential factor, comprising the desirability of starting an entrepreneurial career (Kautonen, van Gelderen, & Tornikoski, 2013; Liñán, Urbano, & Guerrero, 2011). In the TPB framework, there is a consensus concerning the positive relationship between attitude and intentions (Kautonen et al., 2013; Miranda et al., 2017; Roy, Akhtar, & Das, 2017; Van Gelderen, Kautonen, & Fink, 2015). Thus, the paper posits the following hypotheses:

**H4a:** EA fully mediates the positive relationship between CREA and EI

**H4b:** EA fully mediates the positive relationship between PU and EI

**H4c:** EA fully mediates the positive relationship between SELF and EI

***Mediating Effect of Perceived Control (PC) on Contextual Antecedents and Entrepreneurial Intention (EI)***

This construct would include not only the feeling of being able (have the necessary skills to start a business and succeed in it) but also the perception about the controllability of the behavior (Liñán & Chen, 2009). PC refers to a person's belief about executing the planned behavior and the perception that the behavior is within the individual's control (Ajzen, 1991). Other authors define it as the ease or difficulty in performing the entrepreneurial behavior (Cardon & Kirk, 2015; Wilson, Kickul, & Marlino, 2007 as cited by Miranda et al., 2017). Literature generally tends to agree that controllability perceptions are positively related to the intention to become a founder (Schlaegel & Koenig, 2014). Many types of research in the literature would point out on the mediating role of attitudinal dimensions of TPB or together

with TPB, e.g. personal abilities, personality traits, prior personal exposure, role-model influence, and demographic variables as antecedents to TPB (Ferreira et al., 2018; Liñán and Chen, 2006; Rosique-Blasco et al., 2018; Xu et al., 2016; Zapkau et al., 2015; Zhang and Cain, 2017 as cited by Miranda et al., 2017) or, along with TPB, entrepreneurship education and demographic, social and societal variables (Maresch et al., 2016; Marques et al., 2012 as cited by Miranda et al., 2017). Thus, the following alternative hypotheses are proposed:

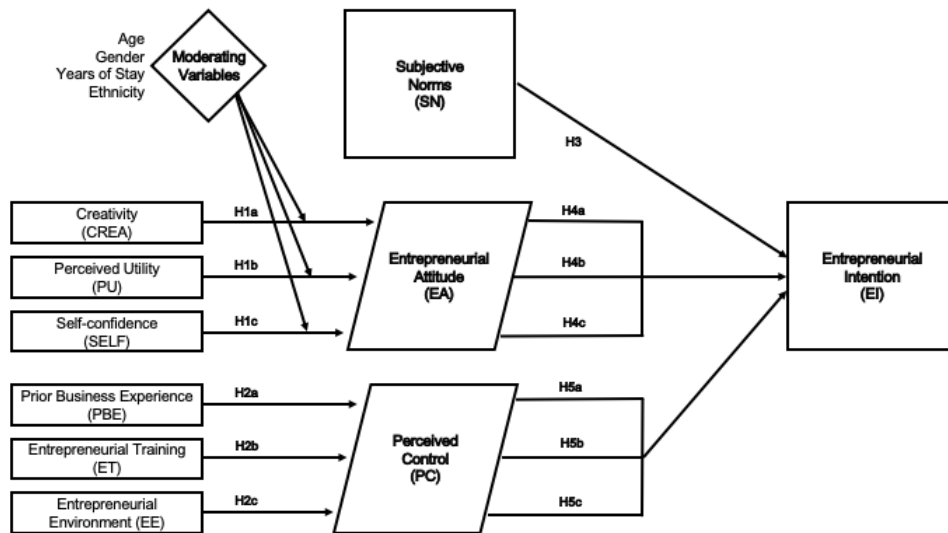
- H5a:** PC fully mediates the positive relationship between PBE and EI
- H5b:** PC fully mediates the positive relationship between ET and EI
- H5c:** PC fully mediates the positive relationship between EE and EI

**Moderating Variables**

To contribute insight to the literature, this paper will also investigate the moderating effects of certain demographic variables similar to the study of Shirokova et al., (2016). Specifically, this study will investigate variables of age, gender, years of stay, and more emphasis on ethnicity towards personal antecedents of creativity, perceived utility, and self-confidence on their intention (Munir, Jianfeng, & Ramzan, 2019; Van Auken, Fry, & Stephens, 2006) Thus, the following subsequent hypotheses are proposed:

- H6:** Age, gender, years of stay, and ethnicity moderate CREA toward EI
- H7:** Age, gender, years of stay, and ethnicity moderate PU toward EI
- H8:** Age, gender, years of stay, and ethnicity moderate SELF toward EI

**Figure 1**  
*Conceptual Framework*



From the objectives and hypotheses of the study, the proposed framework is reflected in Figure 1. The proposed framework is similar with the study of Miranda et al. (2017), but this time, this model was tested in the Asian context, particularly in Mindanao. Further, this model investigated the mediating effects of EA and PC with its corresponding antecedents towards EI. A different set of moderating variables, particularly ethnicity, was also explored.

**Methodology**

The paper utilized descriptive design using a quantitative approach as its research method since the entire paper revolved around testing the hypothesis and examining the relationship of variables. 276 samples were determined using non-probability convenience sampling techniques. In this technique, the population per college and cluster were emailed and invited to participate in the study using an online survey. An online questionnaire was adopted from Miranda et al. (2017) with minimal adaptation on the prior business experience (PBE). The original questionnaire used a 5-point-Likert scale to measure PBE, which in this study, it was modified to a dichotomous construct of yes or no with an additional question on the number of years, if applicable. A 40.9% response rate or 113 out of 276 responses were collected and analyzed using descriptive statistics and multiple regression. For the mediation, a generalized linear model (GLM) mediation analysis was utilized since it allows multiple predictors in a single analysis, capturing better results.

**Discussion of Results**

A total of 40.9% response rate or 113 responses out of the 276 sample sizes were collected and analyzed. The response rate of 40.9% is better than the 38.9% acceptable response rate using the internet as a distribution method (Baruch & Holtom, 2008). The overall reliability with a Cronbach’s alpha of 0.829, is a good indication of reliability, even surpassing the generally acceptable 0.70 reference value (Taber, 2017).

**Table 1**  
*Descriptive Data of the Respondents*

Demographics		Mean	Standard Deviation	Frequency	% of Total
<b>N</b>	113				
<b>Age</b>		36.8	10.8		
<b>Years of Stay</b>		9.80	8.82		
<b>Gender</b>	Male			42	37.2%
	Female			71	62.8%
<b>Ethnicity</b>	Bisaya/Visayan			65	57.5%
	Cebuano			26	23.0%
	Hiligaynon			7	6.2%
	Meranaw			5	4.4%
	Ilokano/Ilocano			2	1.8%
	Tagalog			2	1.8%
	Others			6	5.3%

The participant's mean age was 36.8 (SD=10.8) and have stayed in MSU-IIT for an average of 9.80 (SD=8.82). The respondents comprised 37.2% male and 62.8% female. In terms of ethnicity, 57.5% of the participants were Bisaya/Visayan while 23.0% were Cebuano; Hiligaynon comprised 6.2% of the total respondents followed by Meranaw constituting 4.4% then Ilocano/Ilokano (1.8%) and Tagalog (1.8%). The 5.3% of other ethnicities were Sulod, Misamisnon, Manobo, and Iliganon. The Bisaya/Visayan, Cebuano, Hiligaynon, Ilocano/Ilokano, and Tagalog including Sulod, Misamisnon, and Iliganon were grouped under the non-Muslim non-IP classification while Meranaw and Manobo were grouped under Muslim non-IP ethnic group and IP non-Muslim group respectively. The ethnic classification was based on the major ethnic groupings as provided by the National Commission on Indigenous Peoples (NICP) as cited from the report of Reyes (2019).

**Table 2**  
*Spearman’s Correlation Matrix*

	CREA	PU	SELF	ET	EE	SN	EA	PC	EI
CREA	-								
PU	0.452***	-							
SELF	0.139	0.332***	-						
ET	0.186*	0.061	0.153	-					
EE	0.131	0.116	0.192*	0.235*	-				
SN	0.443***	0.431***	0.322***	0.139	0.294**	-			
EA	0.527***	0.693***	0.349***	0.329***	0.302**	0.542***	-		
PC	0.371***	0.500***	0.278***	0.265***	0.325***	0.462***	0.621***	-	
EI	0.335***	0.474***	0.143	0.357***	0.239*	0.361***	0.699**	0.635***	-

Note. \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

Table 2 confirmed that creativity presented a strong positive correlation,  $r=.527$  ( $p<.001$ ) as a significant antecedent of entrepreneurial attitude (Ward, 2004; Zampetakis, Gotsi, Andriopoulos, & Moustakis, 2011) and consistent with the study of Miranda et al. (2017). While the perceived utility has a strong positive relationship,  $r=.693$  ( $p<.001$ ), as a significant antecedent of entrepreneurial attitude (Gatewood, Shaver, Powers, & Gartner, 2002; Miranda et al., 2017; Shepherd & Douglas, 2000). Furthermore, self-confidence has a weak positive relationship,  $r=.349$  ( $p<.001$ ) with entrepreneurial attitude (Bénabou & Tirole, 2014; Ferreira, Raposo, Rodrigues, Dinis, & do Paço, 2012; Marques, Ferreira, Gomes, & Rodrigues, 2012). Entrepreneurial training  $r=.265$  ( $p<.001$ ) and entrepreneurial environment  $r=.325$  ( $p<.001$ ) have also a weak positive correlation with perceived utility confirming previous studies (Fini, Grimaldi, Marzocchi, & Sobrero, 2012; Foo, Knockaert, Chan, & Erikson, 2016; Miranda et al., 2017; Moog, Werner, Houweling, & Backes-Gellner, 2015; Siegel et al., 2001). Similarly, subjective norms, entrepreneurial attitude, and perceived control presented a high degree of relationship towards entrepreneurial intention, consistent with previous studies on EI (Bercovitz & Feldman, 2008; Ding & Choi, 2011; Goethner, Obschonka, Silbereisen, & Cantner, 2012; Knockaert, Foo, Erikson, & Cools, 2015; Obschonka, Silbereisen, Cantner, & Goethner, 2014, 2015).

To ensure the robustness of the result of the regression model, certain preconditions or assumptions such as a test of normality, residual analysis, heteroskedasticity, and multicollinearity among explanatory variables. The Shapiro-Wilk test of normality indicated that the data in this study were normal ( $W<.965$ ,  $p=.005$ ). When subjected to the Bonferroni outlier test, the corrected “studentized” residuals the critical value was 3.23 ( $p = .002$ ,  $Bp = .19$ ), which means that this particular observation is not an outlier. Furthermore, the Breush Pagan test also indicated that  $BP = 4.402$ ,  $df = 2$ ,  $p = .111$  failed to reject heteroskedasticity, hence, the variance of errors is the same across all levels of the explanatory variables further indicating that the residuals are homoscedastic.

**Table 3**  
*Model Summary*

Model	R	R <sup>2</sup>	RMSE	Overall Model Test				Durbin-Watson
				F	df1	df2	p	
1	0.739	0.546	0.903	43.7	3	109	<.001	2.05

The result of the multiple regression analysis indicated that the main predictors, EA, and PC explained 54.6% of the variance ( $R^2=.546$ ,  $F(3,109)=38.4$ ,  $p<.001$ ) all other things held



constant. Furthermore, it was found that EA (H4) significantly predicted EI ( $\beta=.595, p<.001$ ) as did PC (H5) ( $\beta=.500, p<.001$ ). However, SN (H3) did not significantly predict EI ( $\beta=-.077, p=.436$ ). The alleged weakness of SN in TPB, although not clear (Liñán & Chen, 2009), in this study has not proven its significant relationship towards EI confirming earlier studies, which showed SN as a weak predictor of EI (Autio, H. Keeley, Klofsten, G. C. Parker, & Hay, 2001; Krueger, Reilly, & Carsrud, 2000; Marques et al., 2012; Miranda et al., 2017).

Furthermore, the Durbin-Watson (DW) statistics revealed that the model did not have a first-order autocorrelation problem (DW = 2.05). The variance inflation factor (VIF), which determines multicollinearity between explanatory variables, showed that SN (Tolerance =.631, VIF=1.58), EA (Tolerance =.539, VIF=1.86), and PC (Tolerance =.564, VIF=1.77) values were along with the acceptable 1.0 values, indicating that there is no multicollinearity between explanatory variables.

**Table 4**  
*Model Coefficients*

Predictor	Estimate	SE	t	p	Stand. Estimate	Collinearity Statistics	
						VIF	Tolerance
Intercept	0.2543	0.2933	0.867	0.388			
Subjective Norms	-0.0767	0.0981	-0.781	0.436	-0.0635	1.58	0.631
Entrepreneurial Attitude	0.5947	0.0984	6.043	<.001	0.5314	1.86	0.539
Perceived Control	0.4996	0.1326	3.769	<.001	0.3239	1.77	0.564

One of the main objectives of this study is to investigate the mediating effects of EA to certain personal antecedents (predictors) such as CREA, PU, and SELF in determining EI as well as the mediating effects of PC to some contextual antecedents such as PBE, ET, and EE in determining EI. Using a GLM mediation analysis, table 5 reflects the direct and indirect effect path estimates of the personal and contextual antecedents.

**Table 5**  
*Direct and Indirect Effects Path Estimates*

		Label	Estimate	SE	Z	p
<b>Direct Effects</b>						
H4a.	CREA → EI	c	-0.0581	0.1418	-0.410	0.682
H4b.	PU → EI	c	0.1250	0.1734	0.721	0.471
H4c.	SELF → EI	c	-0.1379	0.1394	-0.989	0.323
H5a.	PBE1 → EI	c	0.0869	0.0966	-0.900	0.368
	PBE2 → EI	c	-0.1334	0.1116	-1.196	0.232
H5b.	ET → EI	c	0.2887	0.1029	2.805	0.005
H5c.	EE → EI	c	-0.1466	0.1775	-0.825	0.409
<b>Indirect Effects</b>						
H4a.	CREA → EA → EI	a x b	0.3851	0.1059	3.635	<.001
H4b.	PU → EA → EI	a x b	0.5925	0.1340	4.420	<.001
H4c.	SELF → EA → EI	a x b	0.2195	0.0999	2.198	0.021
H5a.	PBE1 → PC → EI	a x b	-0.0212	0.0672	-0.315	0.753
	PBE2 → PC → EI	a x b	-0.1060	0.0783	-1.354	0.176
H5b.	ET → PC → EI	a x b	0.1221	0.0726	1.683	0.092
H5c.	EE → PC → EI	a x b	0.4505	0.1310	3.439	<.001

The result of the GLM mediated regression analysis on the personal antecedents indicated a significant effect of EA on the relationship between CREA and EI ( $\beta=.385, p<.001$ ) with no significant direct effect of CREA and EI ( $\beta=-.058, p=.682$ ). EA has a significant effect on the relationship between PU and EI ( $\beta=.592, p<.001$ ) with no significant direct effect of PU and EI ( $\beta=.125, p=.471$ ). Furthermore, a significant effect of EA was also reflected in the relationship between SELF and EI ( $\beta=.220, p=.021$ ) with no significant direct effect of SELF and EI ( $\beta=-.138, p=.323$ ).

For the contextual antecedents, PC has no significant effect on the relationship between PBE1 and PBE2 towards EI (PBE1:  $\beta=-.021, p=.753$ ; PBE2:  $\beta=-.106, p=.176$ ) with no significant direct effect of PBE1 and PBE2 towards EI (PBE1:  $\beta=.087, p=.368$ ; PBE2:  $\beta=-.133, p=.232$ ). Additionally, PC has also no significant effect on the relationship between ET and EI ( $\beta=.122, p=.092$ ) with the significant direct effect of ET and EI ( $\beta=.289, p=.005$ ). Meanwhile, PC has a significant effect on the relationship between EE and EI ( $\beta=.451, p<.001$ ) with no significant direct effect of EE and EI ( $\beta=-.147, p=.409$ ).

In summary, most of the hypotheses posited in this study were accepted. All personal antecedents of creativity (CREA), perceived utility (PU), and self-confidence (SELF) have proven to have a significant relationship to entrepreneurial attitude. However, for the contextual antecedents, not all hypotheses presented were supported. Prior Business Experience (PBE), both experiences in the industry and as a business proprietor did not significantly predict perceived control. It is worth noting however that entrepreneurial training (ET) significantly predicted EI but did not indicate a significant relationship when mediated by PC. This only implies that ET alone can significantly predict EI. Additionally, there was no empirical evidence supporting that subjective norms (SN) significantly predicted entrepreneurial intention (EI) supporting earlier studies (Bercovitz & Feldman, 2008; Knockaert et al., 2015; Miranda et al., 2017; Obschonka, Goethner, Silbereisen, & Cantner, 2012; Obschonka et al., 2015). Entrepreneurial attitude (EA) fully mediates all personal antecedents towards EI. However, in the contextual antecedents, PC fully mediated the relationship of the entrepreneurial environment (EE) and EI only.

**Table 6**  
*Summary of Mean Scores of Entrepreneurial Intention Determinants*

	Personal Antecedents			Contextual Antecedents		Main Determinants of Entrepreneurial Intention			
	CREA	PU	SELF	ET	EE	SN	EA	PC	EI
<b>N</b>	113	113	113	113	113	113	113	113	113
<b>Mean</b>	2.19	2.33	2.35	3.43	2.59	2.47	2.55	2.76	2.96
<b>Standard Deviation</b>	0.762	0.690	0.704	0.989	0.591	1.11	1.20	0.872	1.35
<b>Verbal Interpretation</b>	weakly evident	weakly desired	weakly evident	quite sufficient	moderately desired	weak	negative	difficult	low

In general, MSU-IIT faculty and staff scored lowest in CREA (M=2.19, SD=.762) in the personal antecedents of EA while a relatively low score in EE (M=2.59, SD=.591) as compared to ET in the contextual antecedents of PC. Furthermore, PBE 1 ( $t(111)=.915, p=.362$ ) and PBE 2 ( $t(111)=1.67, p=.097$ ) were not at all significant as compared against PC. Entrepreneurial training (M=3.43, SD=.989), among all determinants of entrepreneurial intention, scored highest which means that entrepreneurial training, particularly awareness

campaigns given by iDEYA and other innovation units, as provided by MSU-IIT to encourage academic entrepreneurship may be effective.

In this study, demographics such as age, gender, years of stay, and ethnicity were also analyzed if these variables moderate the relationship between personal antecedents of CREA, PU, and SELF towards EI. Results indicated that age, gender, and years of stay do not moderate the relationship of CREA, PU, and SELF towards EI. While ethnicity, particularly Ilokano/Ilocano, when compared to other ethnic groups, moderate CREA, PU, and SELF to EI.

### Conclusion

The main objective of this study was to measure the level of entrepreneurial intention among faculty and staff of MSU-IIT adapting the model of Miranda et al. (2017) following the Theory of Planned Behavior as its theoretical framework. Key findings in this study indicated that entrepreneurial intention, explaining 54.6% of the variance, was mainly explained by entrepreneurial attitude and perceived control in this manner, thereby adding to the psychological and personal perspectives of predicting entrepreneurial intention in the literature. However, subjective norms, a common debatable predictor of EI, did not indicate a meaningful relationship towards EI. All personal antecedents of creativity, perceived utility, and self-confidence significantly predicted EI as fully mediated by EA. In terms of contextual antecedents, however, prior business experience, both in the industry or corporate experience and as a business proprietor, did not significantly predict perceived control, contrasting the work of Miranda et al. (2017). In the context of this study, respondents have indicated that their previous experience has a minimal impact on their current jobs in MSU-IIT. Moreover, entrepreneurial training significantly predicted EI alone and not as a contextual antecedent of PC as hypothesized in this study while the entrepreneurial environment significantly predicted EI as fully mediated by PC.

The main contribution of this study in the literature was the analysis on the mediating effects of entrepreneurial attitude to the relationship between personal antecedents and EI as well as the mediating effects of perceived control to the relationship between contextual antecedents and EI as suggested by Feder & Nitu-Antonie (2017) and Menke, (2018). Additionally, self-confidence significantly predicted EI as mediated by EA contrasting the works of Miranda et al. (2017) implying that confidence is indeed an antecedent of entrepreneurial attitude when predicting EI. Furthermore, ethnicity, particularly the Ilokano/Ilocano ethnic group, moderated the relationship of personal antecedents to EI.

Although, this model confirmed that EI is mainly predicted by EA, however, in the context of this study, among all determinants of EI it was found that creativity has the lowest mean score followed closely by perceived utility and self-confidence. This would elicit implications primarily towards MSU-IIT administration to promote personal and professional development activities among faculty and staff targeting critical thinking skills, persuasion, and networking skills. Secondly, the university should foster an entrepreneurial culture to at least encourage peers to engage entrepreneurially. BOR approved Incentives that promote academic entrepreneurship must also be disseminated properly and intensified to potentially increase the desirability of the faculty and staff to engage in AE activities. Lastly, this study suggested that MSU-IIT innovation units should also emphasize different forms of academic entrepreneurship engagement (Mahdavi Mazdeh, Razavi, Hesamamiri, Zahedi, & Elahi, (2013), to widen platforms for this engagement such as custom-made educational courses,

consultancy, training and extension services which will bring rewards to the individual and the organization.

The generally low entrepreneurial intention level of the faculty and staff can be attributed to the prevailing academic culture in MSU-IIT, where faculty and staff have not transitioned yet in considering commercializing their research outputs. Respondents also indicated that they have trouble in spotting business opportunities in their research, notably in the College of Education and the College of Arts and Social Sciences. Currently, faculty and staff in MSU-IIT are still adopting the silo mindset when it comes to collaborative research. This observation was supported in the recent study of Quiñones et al. (2019) which identified barriers in academic entrepreneurship in a Philippine state university. They have found out that misalignment of research and commercialization objectives appeared to be the most influential barrier. Hence, the MSU-IIT administration and other aspiring universities, within and outside the Philippines, may extract insights from this study and take on the challenge head-on by developing faculty and staff as an academic entrepreneur through activities and training emphasizing the socio-economic and market value of collaborative research and its potential impact to the knowledge economy in general and in MSU-IIT in particular. Professional and personal development activities promoting collaborative research undertakings will also help as one of the first steps MSU-IIT administration should consider to effectively promote academic entrepreneurship. Furthermore, this paper will have management implications on other universities, within and outside the Philippines, especially those universities and colleges considering academic entrepreneurship as a strategic goal. The results of this paper can guide them in the early parts of the transition, specifically identifying determinants and antecedents that may help increase the entrepreneurial intention of the members of their academic community. Generally, this paper contributed to the field of global business, particularly in academic entrepreneurship, with a notable emphasis on the psychological and environmental aspects that predict entrepreneurial behavior in the Philippine context. It can be noted that most AE studies were conducted mostly in the Americas and Europe (Hayter, Nelson, Zayed, & O'Connor, 2018; Schmitz et al., 2017). Since the literature is still fragmented, disorganized, and under-theorized (Rothaermel et al., 2007; Nelles and Vorley 2011; Wood 2011; Urbano and Guerrero 2013), results and insights from this paper, specifically the relationship among variables studied, will add to the literature in an Asian context and contribute to the cultural and managerial implications of business and entrepreneurship in the global scale.

Similar to other studies, this too, has its limitations. First, is self-selection bias attracting those respondents with a prior interest in the subject of the study (Miranda et al., 2017). Second, similar to cross-sectional and exploratory studies, establishing the causal relationship between and among variables would become a challenge. Third, the respondents included contractual and temporary faculty and staff which may alter the results of EI due to the security of tenure. Therefore, it is recommended for future research to conduct a longitudinal study among those highly productive faculty and staff, meaning those actively engage in collaborative research engagement and have patents. Moreover, future studies in the Philippine context should consider a wider scope of sample to analyze the determinants of EI among higher education institutions in the country and to include Philippine culture-based entrepreneurial attitudes such as *pakikipagkapwa*, *damayan*, *sahaman* and *amor propio* to mention a few to contextualized the entrepreneurial attitude in the Philippine setting.

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