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Academic Entrepreneurship in Indian Universities : A Structural Modelling Analysis of Determinants and Barriers

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INTRODUCTION

Over the past two decades, higher education across the world is witnessing transformation. Increased competition, student mobility, reduced government funding, stakeholder expectations, access to information and services – are to name just a few. All this is leading to a rethinking and is redefining the way universities need to function and perform. Accountability and transparency is the focus and reporting requirements & MIS are getting stringent. All these taken together call for new governance and innovative model, those higher education institutions must adopt, for their survival and growth.

Universities are now being considered as institutions that are increasingly and actively partnering with external firms/organizations for commercial activities and do not operate as separate islands of knowledge (Zhang *et al.*, 2016). They are, thus, collaborating with industry in varied forms like contract research, university spin-offs, licensing and providing consultancy services. Innovation, as a matter of fact is not an outcome of a singular source. Whether it is formulation of a new policy document by the government, creation of new knowledge in universities or a new product development in industry, several actors and institutions need to collaborate and network with one another. This concept requires universities to take a proactive role, together with industry

and government and developing a strategy that focusing on creating an environment of innovation and creativity (Leydesdorff, Etzkowitz & Kushnir, 2015).

At the heart of the any entrepreneurial university is the faculty. Academic entrepreneurs comprise faculty and researchers who seek opportunities to convert academic knowledge into practical knowledge and reach out for solutions for the development of technologies and novel social practices. They can, thus, be regarded as agents of institutional change who have a strategic and a far reaching role to play in pursuance to the third mission of the University (Martin, 2012).

In context of India, as per the Annual Report of The Office of the Controller General of Patents, Designs, Trademark and Geographical Indications, Government of India during the year 2015-16, a total of 46,904 applications (13066 by Indians and 88383 by foreign applications) for patents were filed out of which 6326 were finally granted patents. However, if we critically look into the applications filed from Indian universities and institutions, the total applications filed is less than 900 with Indian Institute of Technology (IIT) filing approximately 391 applications. Among the top 10 institutes, none of them include any state university. Of the total applications filed, only 23 applications have been filed from the state of Jammu & Kashmir during 2015-16. This statistics can be taken as an indicator, which reflects that academic entrepreneurial activities undertaken in state level universities is still low.

Extant research on academic entrepreneurship has been conducted in US, UK and other European countries. Even the latest work by Hayter, Nelson, Zayed, & O'Connor (2018) on academic entrepreneurship observed that during the period 2000 – 2017, research on academic entrepreneurship is primarily conducted in US, UK and other European countries with lack of representation from Asia, Africa, the Middle East and South America. An extensive literature review indicates that only few studies have been conducted in the Indian context (Baporikar, 2016; Bhowmick & Ghosh, 2015; Sharma, 2017; Sharma, 2015) but they have viewed academic entrepreneurship from the perspective of students taking up entrepreneurial initiatives and have not included the academic entrepreneurial intentions of the faculty members. To fill this gap in literature, this study makes the attempt to study academic entrepreneurship intention of faculty members working in the Indian State universities. The significance of this study is, therefore, twofold. First, it seeks to fill a void in the literature. Second, this study hopes to expand our understanding of nature of academic entrepreneurship prevalent in the select universities and gain insight into the

antecedents of academic entrepreneurial intentions. This study is also one of the unique research work to examine the phenomenon of academic entrepreneurship in the state of Jammu & Kashmir (India).

LITERATURE REVIEW

Entrepreneurial Universities

In a knowledge driven society, the role of universities is witnessing a cultural transformation. An entrepreneurial university focuses on teaching, research and service for the society. According to Etzkowitz & Leydesdorff (2000) the institutional arrangement of university-industry-government relations drives the innovation process in any country. They propose a Triple Helix Model of Innovation, where the innovation system is complex yet dynamic and is apparent at the organization, local, regional, national and international level leading to emergence of entrepreneurial university. The model proposes that the industry is the centre of production, government acts a facilitator between the university and industry and university is a supplier of innovation, knowledge and technology (Etzkowitz, 2002). According to Etzkowitz, Webster, Gebhardt & Terra (2000, p. 313), an entrepreneurial university encompasses "a third-mission of economic development in addition to research and teaching, though the precise shape this takes might vary such that different scenarios of academic development can be projected."

According to Burykhina (2009), Triple Helix model is based on an assumption that university has a major role in producing innovative products or services; promotes interaction and strategic alliance between the three independent areas of society i.e the university, industry and government and finally the outcome of this trilateral relationship is the growing innovation in the society. Earlier Etzkowitz (2003) proposed that an entrepreneurial university includes the following developmental mechanisms - Internal Transformation, Trans-institutional impact, Interface processes and Recursive effects. According to Röpke (1998), entrepreneurial universities can be interpreted in three ways : (a) the university/higher institutions becoming entrepreneurial, (b) university employees or students establishing themselves as entrepreneurs, (c) or engagement of universities with industries. Entrepreneurial universities have the potential to innovate, discover, identify and create opportunities. They have the ability to take risks and face all the challenges ahead (Kirby, 2000). Commercialization and Commoditization of research outcomes are the two main aspects of an entrepreneurial university (Jacob, Lundqvist and Hellsmark, 2003).

Recently Etzkowitz (2016) argue that a facilitative legal framework is not a sufficient condition for creating an entrepreneurial university. Etzkowitz (2016) propose a Global Entrepreneurial University Metrics (GEUM) initiative that enables a university to raise their performance on all three mission areas i.e. education, research and innovation. In the GEUM White paper developed, they have classified the indicators into four analytical categories namely – inputs (people, resources, knowledge, university policies, education and development opportunities), throughputs (activities, capabilities etc.), outputs (publications, patents etc.) and outcomes (strategic positioning, rankings, reputation etc.).

According to OECD framework for Entrepreneurial Universities (2012), there are seven areas on which the universities should assess themselves, which are (a) Leadership and Governance (b) Organizational Capacity, People and Incentives (c) Entrepreneurship development in teaching and learning (d) Pathways for entrepreneurs (e) University – business / external relationships for knowledge exchange (f) Entrepreneurial University as an internationalized institution (g) Measuring the impact of the Entrepreneurial University

Academic Entrepreneurship

With the increasing expectations from the universities, academic faculty across the world is expected to engage in entrepreneurial endeavours. (Davey, Rossano and van der Sijde, 2016). Universities are expected to collaborate with industries and undertake joint research projects which ultimately usher new innovation contributing towards the economic growth and competitiveness of the nations (Laukkanen, 2003). Rothaermel, Agung and Jiang (2007) while synthesizing the findings of 173 research papers on university entrepreneurship observed that an entrepreneurial university through its academic faculty and scholars engages into several activities including existence of a formal program, research support from industry, licensing, research joint ventures, existence of incubators and science parks. The engagement of academic faculty is various entrepreneurial behaviour has been conceptualized as academic entrepreneurship (Mars and Rios-Aguilar, 2010).

Academic entrepreneurship may be defined as "the involvement of academic scientists and organizations in commercially relevant activities in different forms, including industry-university collaborations, university-based venture funds, university-based incubator firms, start-ups by academics, and double appointments of faculty members in firms and academic departments" (Pilegaard *et al.*, 2010). The narrow perspective of academic entrepreneurship lays emphasis on commercialization of university – generated knowledge through

spin-offs (Shane, 2004) and academic start-ups (Etzkowitz *et al.* 2001; Davey, Rossano and van der Sijde, 2016). The contemporary perspective on academic entrepreneurship takes a much broader view which focuses on dynamism and heterogeneity of academics and lays emphasis on any form of innovation and entrepreneurial initiative in teaching and research (Etzkowitz and Leydesdorff, 2000). Klofsten and Jones-Evans (2000) and Siegel and Wright (2015) focus on a broader perspective of academic entrepreneurship which moves beyond academic faculty and consider students and alumni as important stakeholders in promoting entrepreneurial culture within the university set-up (Siegel and Wright, 2015). Efforts of academic institutions to create potential economic benefits besides teaching and research, and an objective of becoming an entrepreneurial university is regarded as academic entrepreneurship (Ozgul and Kunday, 2015). Overall, academic entrepreneurship is a process which essentially encompasses creation of a culture of innovation and instils a spirit of entrepreneurship which facilitates and contributes towards creating value in the society (Meyers and Pruthi, 2011). In this paper, we focus on a broader perspective of academic entrepreneurship keeping in view the study context where state universities are yet in the nascent stage of becoming entrepreneurial universities.

Academic Entrepreneurs

Academic entrepreneurs may be defined as those higher education actors who are involved in activities that lead to creation of economic resources for themselves and their institutions as well as contribute in creating a platform which has social relevance. They have the potential to identify opportunities that exist both within and outside the organization and they carefully draw out strategies to minimize risks attached with these opportunities (Keh *et al.*, 2002). A researcher when mobilizes his or her academic knowledge in developing innovative products or services is often regarded as an academic entrepreneur (Fontes, 2005). Academic entrepreneurs derive dual benefits from their research by both its commercialization as well as its utilization for further academic and research pursuits (Lacetera, 2009). D'este and Perkmann (2011) in their work identify the motivational drivers underpinning the various forms of engagement with the industry in context of an entrepreneurial university. Since, engaging with the industry is a discretionary behaviour, there has to be underlying motivational drivers encouraging academic faculty to engage with the industry. There are two schools of thoughts as to why faculty engage with the industry. The first school of thought believe that academics collaborate with the industry to commercialize their research, whereas the second school of thought believes

that academics collaborate with the industry to support their research. Based on empirical work in UK, D'este and Perkmann (2011) observed that the motivational factor can be classified under four broad categories (a) Commercialization (b) Learning (c) Access to in-kind resources and (d) Access to funding. Of the above four motivation, their research observed that commercialization motive is least among the four motivations indicating that motivation for academic entrepreneurship is to further their own research.

Goethner, Obschonka, Silbereisen & Cantner (2012) obseverd that economic factors (i.e. human capital, social capital, expected benefits) and psychological factors (entrepreneurial attitudes, norms and control perceptions) directly influence academics intention to engage in entrepreneurial behaviour. Similarly, Miranda, Chamorro-Mera & Rubio (2017) found that entrepreneurial attitude, creativity, perceived utility and entrepreneurial experience have a significant influence on academic entrepreneurship. Earlier Goethner, Obschonka, Silbereisen & Cantner (2009) found that personal characteristics (i.e., personal attitudes toward research commercialization, entrepreneurial control-beliefs, entrepreneurial self-identity, and prior entrepreneurial experience) have a significant influence on academic faculty intention to engage in entrepreneurial behaviour. Recently Moutinho, Au-Yong-Oliveira, Coelho & Manso (2016) explore a number of determinants of academic entrepreneurship and observed that entrepreneurial culture, access to university infrastructure, TTO effectiveness, social capital, novelty of research outcomes, cooperation with companies, technology commercialization, support to research outcomes, support to spin offs influence faculty intention to engage in entrepreneurial behaviour.

Recently Hayter, Nelson, Zayed and O'Connor (2018), while conceptualizing academic entrepreneurship eco-system and doing a detailed analysis of research papers on this subject, classified the determinants under eight categories namely (a) Characteristics of Academic Entrepreneurs (b) Human Capital (c) Social Networks (d) Entrepreneurial Environment (e) Financial Resources (f) Scientific, Technical and Product Characteristics (g) Academic Entrepreneurship Programmes and (h) University Management and Policies

Academic Entrepreneurship Intentions - Theoretical Framework

Cognitive theorists (Ajzen 1991) have demonstrated the importance that intentional elements, such as expectation, attitude, and belief, have on behavioural outcomes. A large body of research validates intention as a precursor of entrepreneurial behaviour. Thompson (2009) defines entrepreneurial intention as a strong belief, disposition and commitment towards creating a new firm or

adding value addition to a new firm. Bird (1998) defines entrepreneurial intentions as a mindful state that orients an individual towards entrepreneurial activities and that entrepreneurial intention is the most important pre-requisite of entrepreneurial action (Kolvereid & Isaken, 2006; Krueger & Carsrud, 1993; Lee *et al.*, 2011).

Extant research has used various theoretical frameworks to study entrepreneurial intentions. In this study, we used Theory of Planned Behaviour which is a social cognitive theory used to understand human intention and action. According to this theory, people might have the intention to perform certain behaviour but might not have the required resources or opportunities. The ability or self efficacy to engage in the desired behaviour is regarded as Perceived Behavioural Control. In this theory (Ajzen, 1991) assumed that behaviour can be better predicted when individual's intention is combined with the perceived behaviour control. In context of entrepreneurship, Krueger and Carsrud (1993) first applied theory of planned behaviour arguing that any entrepreneurial activity represented a planned or intentional behaviour and therefore intention based behavioural model is best when it comes to understanding entrepreneurial behaviour. Engle *et al.* (2010) applied theory of planned behaviour to predict entrepreneurial intent in12 countries representing all ten of the global clusters as identified in the GLOBE project. Their finding was that theory of planned behaviour successfully predicts entrepreneurial intention in all the countries. This finding has been recently supported by Lortie & Castogiovanni (2015) wherein they argue that theory of planned behaviour has made a considerable contribution to the entrepreneurship literature.

Extant research in the domain of entrepreneurship has applied theory of planned behaviour across various contexts including family business entrepreneurship (Carr and Sequeira 2007), entrepreneurial career option (Gorgievski, Stephan, Laguna and Moriano, 2018), social entrepreneurship intention (Nga & Shamuganathan, 2010) and academic entrepreneurship intention (Goethner *et al.*, 2012; Guerrero & Urbano, 2014; Miranda, Chamorro-Mera & Rubio, 2017).

According to the Theory of Planned Behaviour, the three cognitive antecedents that predict intentions are (a) attitude towards the behaviour (b) the subjective norms and (c) perceived behaviour control. Ajzen (1991) described attitude that one holds towards a behaviour as, "the degree to which a person has a favourable or unfavourable evaluation or appraisal of the behaviour in question." It is assumed that individuals attitude towards the act is favourable only if his / her perception about the resulting consequences is positive. The

more favourable an individual's expectations about the consequences of the behaviour, the greater would be intentions to engage in the given behaviour (Shapero and Sokol, 1982; Krueger *et al.*, 2000; van Gelderen and Jansen, 2006; Pruett *et al.*, 2009). In context of academic entrepreneurship, existing literature established that academicians/scientists were found to be more inclined towards academic entrepreneurship and subsequently, devoted more time and energies towards entrepreneurial activities, only if they perceived the resulting output to be more favourable and beneficial, professionally and commercially (Gulbrandsen, 2005; Owen-Smith & Powell, 2001). Based on this we hypothesize

H1 : Behavioural Attitude will have positive significant relationship with Academic Entrepreneurial Intentions

Subjective norms can be referred to as "the perceived social influence from the important referents (family, friends and colleagues etc.) to engage in a specific behaviour" (Ajzen, 1991; 2001). If the person thinks that the given behaviour shall be accepted by his/her peer group then the person is more likely to form intentions to engage in a given behaviour (Ajzen, 1991). Existing literature in academic entrepreneurship has also discussed about the important role of social environment in influencing academicians' intentions to engage in entrepreneurial behaviour (Goethner *et al.*, 2012; Huyghe and Knockaert, 2015; Obschonka *et al.*, 2012; Obschonka *et al.*, 2015; Rasmussen, Mosey, & Wright, 2014). It is believed that a person's decision to engage in entrepreneurial activity is largely conditioned by the societal pressure and the past initiatives of other academicians to start their own ventures enables other people to believe that engaging in entrepreneurship is socially acceptable, which further leads to increased entrepreneurial intentions (Obschonka *et al.*, 2012).

H2 : Subjective Norm will have positive significant relationship with Academic Entrepreneurial Intentions

Perceived Behavioural Control refers to "individuals' perceived confidence in themselves to perform a specific behaviour" (Ajzen, 1991). Perceived Control Behaviour is influenced by the situational factors like availability of resources, opportunities. and internal factors like inner capabilities or knowledge to perform the given behaviour. A high perceived behavioural control determines behavioural intentions and the implementation of the behaviour (Ajzen, 1991; Armitage & Conner, 2001). In the entrepreneurship literature, this construct is closely associated with the concept of entrepreneurial self- efficacy construct, and some past studies have also used entrepreneurial

self-efficacy instead of PBC to examine entrepreneurial intentions (Schlaegel *et al.*, 2013; Van Gelderen *et al.*, 2008). Existing work on academic entrepreneurship by Obschonka *et al.* (2012) and Goethner *et al.* (2012) empirically validated the positive influence of perceived behavioural control in predicting the entrepreneurial intentions. Based on this we posit

H3 : Perceived Behavioural Control will have positive significant relationship with Academic Entrepreneurial Intentions

Barriers to Academic Entrepreneurship

Balancing between the actual academic roles and entrepreneurial activities is a great challenge for any academician (Jones-Evans 1997). While academicians believe to have numerous advantages (like academic acknowledgement, financial rewards and benefits, status and prestige etc) of engaging in entrepreneurial behaviour, but, the engagement in such activities is not realized without hindrances and obstacles. Inadequate entrepreneurial knowledge and skills among the academicians (Laukkanen 2003), and ineffective reward system which does not support academic entrepreneurship (Jones-Evans 1997), has been identified to impede the potential advantages of academic entrepreneurship. Further, different researches have attempted to understand the various constraints and obstacles hindering the process of academic entrepreneurship. Researchers have also considered inefficient management of knowledge assets as inhibitor or constraint of technology transfer (Siegel & Waldman, 2003). Lack of experience, knowledge and skills of the technology transfer offices could lead to ineffectiveness of these processes and further may cause improper use of knowledge assets (Ndonzuau, Pirnay & Surlemont, 2002).

According to Goldfarb & Henrekson (2003), the barriers to academic entrepreneurship can be classified under three broad categories (a) Individual Level Barriers – This pertains to the factors that specific to the academic faculty. This may include individual personality, lack of risk taking capability, lack of opportunity recognition, lack of business ideas. (b) Institutional Level Barriers – This pertains to lack of entrepreneurial drive within the university setup. Various factors can act as barrier to promotion of academic entrepreneurship including lack of entrepreneurial drive among stakeholders, lack of reward mechanism, low level of industry experience, limited market knowledge, no contacts in the industry, lack of university policy and (c) Environmental Level Barriers - This corresponds to the overall entrepreneurial ecosystem wherein the university

exists. Various factors that can be covered under this include lack of pre-seed capital, difficulties in access to credit / financing, taxation procedures, economy status, socio-cultural factors, difficulty to introduce new products in the market. Similar classification is provided by Farsi, Modarresi & Zarea (2011) while studying obstacles of academic entrepreneurship in University at Tehran. Based on the existing research we hypothesize.

H4 : Individual Level Barriers negatively influence Academic Entrepreneurial Intentions

H5 : Institutional Level Barriers negatively influence Academic Entrepreneurial Intentions

H6 : Environmental Level Barriers negatively influence Academic Entrepreneurial Intentions

RESEARCH METHODOLOGY

As the principal research objective of the present study is to assess the faculty member academic entrepreneurial intentions and its relationship to individual level determinants, i.e., behavioural attitude, subjective norm and perceived behavioural control; and also the role of individual, institutional and environmental level barriers, this study is adopts the quantitative approach of testing the hypothesis. Quantitative research methods are considered as appropriate technique to measure the intentions, attitudes, behaviour and explore the associations with other factors or different groups (Avey *et al.*, 2009; Gogolin & Swartz, 1992).

The scope of this research extends to the following select universities, (encompassing all the faculties and departments) in the state of Jammu & Kashmir (a) The University of Jammu, Jammu (b) University of Kashmir, Kashmir (c) Shri Mata Vaishno Devi University, Katra and (d) Baba Ghulam Shah Badshah University, Rajouri. All these universities are distinct in their own ways in terms of their evolution, nature, course offerings, and geographical locations, sources of funding and with a unique 'locale' effect in terms of socio-ethnic composition. Study of academic entrepreneurship within these universities shall, therefore, provide a comprehensive and holistic understanding of the phenomenon of academic entrepreneurial intentions.

The list of permanently faculty members appointed in the four Universities were procured from the Teaching Wing / Website of the respective Universities. The information on the designation, discipline, email address of all

the faculty members was complied. The total list included 248 faculty members of University of Jammu, 424 faculty members of university of Kashmir, 124 faculty members of Shri Mata Vaishno Devi University and 117 from Baba Ghulam Shah Badshah University. This list was considered as the sampling frame for the study.

For our study, we received the completed questionnaires from a total of 409 respondents the final sample size out of a total sampling frame of 913 respondents indicating an average response rate of 44.79% which is fairly high keeping in view the nature of study. In terms of institution, 137 responses (55.25% response rate) were received from University of Jammu; 144 responses (33.96% response rate) were received from University of Kashmir; 67 responses (54.03% response rate) were received from Shri Mata Vaishno Devi University and 61 responses (52.13% response rate) from Baba Ghulam Shah Badshah University.

The questionnaire is divided into three sections. Section A collects information related to demographic profile of the respondents which includes age, gender, position, discipline, university and tenure. Section B includes items corresponding to barriers of academic entrepreneurship. Individual level barriers have been measured using four items; organizational level barriers have been measured using five items and environmental barriers have been measured using four items. All the items were measured on five point Likert scale with 1 as Strongly Disagree and 5 and Strongly Agree. The last section C deals with the constructs of Theory of Planned Behaviour including behavioural attitude, perceived behavioural control, subjective norm and academic behavioural intents. Behavioral attitude has been measured using three items; subjective norms using three items; perceived behavioral control using three items and final academic behavioral intentions using three items. All the items of the scale are measured on a 5 point Likert scale with 1 as Strongly Disagree and 5 and Strongly Agree. All the items were adopted from the existing research.

DATA ANALYSIS AND FINDINGS

The proposed research model was tested using the Partial least square technique PLS-SEM, which was performed using SmartPLS 2.0 software PLS-SEM has become a popular and well established technique which has been recognized by various researchers in several fields including marketing and strategic management (Hair *et al.*, 2012). Its increased usage and popularity is due to the technique's ability to handle complex models with several constructs and calculating model parameters under conditions of non-normality. The data analysis was done in two stages wherein the first stage included assessment of

measurement model and the second stage included the development of full structure equation model (Gerbing and Anderson 1988).

Through demographic profile of the respondents is presented below in Table 1

Table 1
Respondent Profile

		University of Jammu (JU)	University of Kashmir (KU)	SMVDU	BGBSU
Gender	Male	65	110	53	48
	Female	72	34	14	13
	Assistant Professor	67	87	60	59
	Associate Professor	17	18	5	2
	Professor	53	39	2	0
Faculty	Sciences	79	75	45	21
	Non-Sciences	58	69	22	40
Total [409] 137		**144**	**67**	**61**	
Total Faculty Strength		**248**	**424**	**124**	**117**
Sample as % of Population		**55.25%**	**33.96%**	**54.03%**	**52.13%**

Note : Total Faculty Strength as updated on 31st March 2018

Measurement Model

In the measurement model, the convergent and discriminant validity of the constructs and reliability of all the multiple item scales were examined. We have examined indicator reliability using factor loadings as mentioned below in the Table 2 and all the values were above the minimum acceptable value of 0.70 (Fornell and Larcker 1981). Furthermore, Table 3 shows Average Variance Explained (AVE), calculated by taking square root of the correlation between constructs, for each item, which were above the minimum acceptable value of 0.50 (Fornell and Larcker 1981) The discriminant validity of the constructs can be confirmed if the square root of AVE is greater than the correlation between the constructs (Fornell and Larcker 1981). The values of AVE square root and the correlation of the constructs are presented in Table 3 which suggests satisfactory discriminant validity of the measurements. All the above results supported the validity and reliability of the scales; hence these scales were

Table 2
Measurement Items and Loadings

Behavioural Attitude (BA)	**Loading**
BA1 - Commercialization of research within University is a good idea	0.764
BA2 - Undertaking applied research will help to build my reputation as a researcher	0.845
BA3 - If I have an opportunity I will like to take my research to the industry for the benefit of the society	0.816
Subjective Norm (SN)	
SN1 - My peers and colleagues think that I should undertake applied research	0.714
SN2 - People in my professional network will appreciate my efforts of collaborating with industry for research	0.863
SN3 - My scholars / students will put me in high regard because of conducting applied research	0.843
Perceived Behavioural Control (PBC)	
PBC1 - I have enough knowledge about the issues confronting the industry	0.857
PBC2 - I have enough expertise to undertake applied research	0.826
PBC3 - I have enough resources available with me to undertake applied research	0.740
Academic Entrepreneurship Intention (BI)	
BI1 - I will surely undertake industry oriented research BI2 - I will collaborate with the industry professionals for joint work BI3 - I will encourage people in my professional network to undertake applied research	0.890 0.853 0.858
Individual Level Barriers (AEI)	
AEI1 - I have limited understanding of the functioning of the industry (related to my domain) and the issues that confront them	0.853
AEI2 - I do not have access to funds / facilities that can help me to undertake applied research	0.844
AEI3 - I do not have understanding of the rules and procedures related to intellectual property rights and filing of patents	0.701
Organizational Level Barriers (OB)	
OB1 - There is no research strategy in our University	0.701

Contd.

Contd. Table 1

OB2 - The bureaucratic procedures / inflexible management system does not encourage faculty members to undertake applied research	0.788
OB3 - There are no incentives / rewards for the faculty members to undertake industry oriented research	0.956
Environmental Level Barriers (EB)	
EB1 - There is a communication gap between the local industry and our university	0.739
EB2 - There exists a trust deficit among industry professionals about the quality of research in our university	0.896
EB3 - The political and legal environment of our region does not encourage collaboration with the industry	0.872

Table 3
Validity and Reliability

	CR	AVE	Cronbach Alpha	BA	SN	PBC	IB	OB	EB	AEI
BA	0.948	0.894	0.954	0.809						
AEI	0.925	0.749	0.786	0.49	0.867					
EB	0.874	0.769	0.824	0.35	0.19	0.846				
IB	0.847	0.786	0.798	0.09	-0.08	0.04	0.800			
OI	0.875	0.748	0.847	-0.10	0.01	-0.26	-0.00	0.69		
PBC	0.927	0.785	0.846	0.41	0.63	0.20	-0.17	0.14	0.808	
SN	0.878	0.768	0.789	0.48	0.67	0.21	-0.19	-0.01	0.607	0.809

CR : Composite Reliability; AVE : Average Variance Explained; BA : Behavioural Attitude; SN : Subjective Norm; PBC : Perceived Behavioural Control; IB : Individual Level Barriers; OB : Organizational Level Barriers; EB : Environmental Level Barriers; AEI : Academic Behavioural Intention.

further utilized to test the structural model. The reliability of the indicators was also verified using Composite Reliability coefficient (Werts, Linn & Joreskog, 1974) and Cronbach Coefficient Alpha (Cronbach, 1970). The values of all the coefficients are presented in Table 3. The values are above the threshold value (0.70) as suggested by (Churchill, 1979).

Structural Model

The structural model and the hypothesized relationships were tested by using PLS analysis using SmartPLS 2.0 software.The explanatory power of the model was determined by assessing the R2 values. Fig. 1 shows results of the structural model. The results indicate that the model explains a variation of 55.66% in Academic Entrepreneurial Intentions were found as hypothesized behavioural attitude (H1), subjective norm (H2) and perceived behavioural control (H3) all positively affect the academic entrepreneurial intentions. Of these subjective norm ($\beta = 0.402$, $P < 0.05$) has the highest effect, followed by perceived behavioural control ($\beta = 0.325$, $P < 0.05$) and then the behavioural attitude ($\beta = 0.165$, $P < 0.05$). Of the three barriers, individual barriers ($\beta = -0.065$, $P < 0.05$) and environmental barriers ($\beta = -0.030$, $P < 0.05$) have significant negative effect on academic entrepreneurial intention. Organizational level barriers were not having any impact on academic entrepreneurial intentions.

Table 4
Summary of Test Results for the Structural Model

Hypothesis	Path	Standardized Path Coefficient	P-Value	Supported?
H1	BA – AEI	0.165	<0.05	Yes
H2	SN – AEI	0.402	<0.05	Yes
H3	PBC – AEI	0.325	<0.05	Yes
H4	IB – AEI	-0.065	<0.05	Yes
H5	OB – AEI	-0.009	>0.05	No
H6	EB - AEI	-0.030	<0.05	Yes

CONCLUSION

This is one of the rare studies on academic entrepreneurial intentions conducted in the Indian context. Our findings support that Theory of Planned Behaviour can be applied to examine the academic entrepreneurial intentions. Further, our study is unique in the sense that it also takes into account the barriers to academic entrepreneurship in a single framework. The overall findings suggest that subjective norm has the highest impact on the intentions to adopt entrepreneurial route. This indicates that through the peer group, network of

colleagues a faculty member could develop higher intentions to pursue entrepreneurial activities. We propose that through academic networking events like conference and workshop such an idea should be promoted. The next major determinant is the perceived behavioural control, which indicates that if the self efficacy or the expertise of the faculty members is enhanced, they will be more keen to pursue academic entrepreneurial activities. The third determinant is the attitude. We observed that attitude, too, plays a vital role in shaping academic entrepreneurial intentions. Adequate effort should be made to build a positive attitude towards academic entrepreneurship activities.

Our study also observed that individual and environmental barriers play a negative role in academic entrepreneurial intentions. To overcome the barriers, we recommend the following strategies. Leadership and Governance, at the organizational level, are very important aspects of the university that have the potential to influence all the other aspects of its functioning. It encompasses leadership & management, strategies and mission, authorities and decision making, values and norms. The support and commitment of the top management is fundamental in determining the success of academic entrepreneurship, especially in the academic environment. Entrepreneurial universities operate in an environment of uncertainties and complexities that demand them to be flexible in their functioning. We propose the following few strategies

- Incorporating Entrepreneurial Intent in the University Mission Statement
- Incorporating entrepreneurial development in the research strategy and policies of the University
- Representation of stakeholder groups in University Bodies
- Establishment of Formal Institutional structures
- Capacity Building of faculty members
- Promoting faculty mobility for Industry Internships
- Promoting Student Entrepreneurship

This study presented empirical evidence that contributes to knowledge about academic entrepreneurship literature, but these research findings must be interpreted within the limitations of this study. Due to constraint of time and resources, the scope of the study was confined to only four universities of Jammu and Kashmir which raises the issues of generalisability of the findings to other higher educational institutions across the country. The proposed measurement and structural models were tested at an aggregate level i.e. the data collected from all the four universities was combined for analysis purpose. This was because of small sample sizes within each university. This analysis

might have its own limitations as there can be different causal relationships across universities

Future studies can conduct similar work in universities across the length and breadth of the country. Further, a comparative analysis can also be undertaken between State Government funded, Central Government funded and Private universities. Future research could replicate the principle features of this study with a larger sample of different universities in different states, regions or countries. Also, there are other constructs like organizational climate that can be included in the future studies.

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