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## Entrepreneurial Intention, Entrepreneurial Orientation of Faculty and Students towards Commercialization

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### Abstract

The present study is conducted to find out the entrepreneurial intention and entrepreneurial orientation of faculty and students towards commercialization of research. The study is conducted on a sample of respondents belonging to one research university of Malaysia. The results indicate that entrepreneurial orientation of faculty and students is having more influence towards commercialization of research than entrepreneurial intention alone. The results also indicate that the faculty and students are having a strong entrepreneurial mindset. The study contributes to the existing body of literature related to entrepreneurship and the concept of entrepreneurial university. The study also recommends future course of action.

*Keywords:* Entrepreneurial intention, entrepreneurial orientation, commercialization, faculty, university, Malaysia

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### 1. Introduction

For the success of modern day complex societies entrepreneurship has become of vital importance not just for their survival but also for their sustainability (Audretch, 2007). Entrepreneurship comes with many promises and is viewed differently by different stakeholders. Policy makers focus it from view point of economic competitiveness in global markets and employment creation opportunities. Entrepreneur focuses it from opportunity exploitation perspective that would yield high gains and a meaningful career (Kuckertz & Wagner, 2010).

Promoting entrepreneurship in the society which is riddled with enormous economic and social challenges is essential and that this should start at early age and policies designed to incorporate this promotion in the educational institutions for fostering entrepreneurial skills in the youth of society (World Economic Forum, 2009). Lenan and Chen (2009) are of the opinion that promoting strong and friendly entrepreneurial culture through policy reforms like

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legal frameworks that facilitate firm creation are important for transmitting message of value entrepreneurship can add to the people.

## 2. Literature Review

### 2.1. Entrepreneurial Intention

Entrepreneurship is a process that occurs over a period of time (Kyro & Carrier, 2005). If entrepreneurship is viewed as a process, then intention becomes a natural precursor to the entrepreneurial activity (Lee & Wong, 2004). According to Krueger (2007) entrepreneurship is intentional in nature and comes through choice and not by accident. The environment provides the choice for entrepreneurial activity which has also been proven in the study of Obschonk and Schmitt-Rodermund (2010). The study concluded that entrepreneurial intentions are fed during early part of life by developing entrepreneurial competencies such as leadership and adolescence inventions and research activity.

Educational institutions play a major role in this development of early entrepreneurial competencies which are later manifested in the form of entrepreneurial activity. Research indicates that educational institutions as well as the members of the faculty involved in entrepreneurial activity play an important role in developing entrepreneurial spirit among students through innovative programs and research oriented culture (Kuratko, 2005; Honig, 2004; Carrier, 2005; Lenan & Chen, 2009; Krueger, Reilly & Carsrud, 2000; Lüthje & Franke, 2003, Souitaris, Zerbini & Al-Laham, 2007).

Prodan and Drnovsek (2010) have highlighted that there is literature gap in the emergence of academic's entrepreneurial intentions. That is how academic's entrepreneurial intentions develop. Measuring these intentions in academics would provide useful insight into the emergence of high technology spin-off firms. Studies have highlighted that prior academic experience, experience with patenting activity, interaction with industry and research focus are few of the important determinants in emergence of academic entrepreneurial intentions. According to Grandi and Grimaldi (2005), academics while creating new ventures are already involved in the invention and commercialization phases, showing the business skills and scientific knowledge. They are of the opinion that academics paying attention to industry specific research are more likely to have their own company. Similarly, Landry, Amara, and Rherrad (2006) also highlight that academics involved in consulting activities with private firms, government agencies and organizations associated with their area of research will find themselves engaged in commercialization activities leading to company formation.

The presence of technology based firms has long been associated with the economic growth of a country, but intention to start a new venture reflect the factors like organizational innovative climate, incentives and rewards and above all individual's innovative orientation. These factors become antecedents for purposive behavior or the intention towards entrepreneurship (Lee, Wong, Foo, & Leung, 2011).

Entrepreneurial intention indicates the effort that the person is willing to make to carry out that entrepreneurial behavior. This intention is based on three main motivational factors that influence the ultimate behavior (Linan, 2004; Linan & Chen, 2009). *Attitude toward start-up* refers to the personal liking or disliking towards becoming an entrepreneur; *Subjective norm* refers to the perception that concerned people (family, peers) approve of the activity; and *Perceived behavioral control* refers to the perception of the ease or difficulty of becoming an entrepreneur. These cognitive factors provide an insight into the complex process of entrepreneurship (Baron, 2004).

### 2.2. Entrepreneurial Orientation

For the past two decades or so, there has been a strong growth in the university-industry linkages that has a profound impact on the working of the academic scientists and researchers (Lam, 2010). This has resulted in academic capitalization of knowledge. Universities, themselves are involved in the exploitation of research to boost their income and adapt to competitive environment (Henkel, 2007; Macho-Stadler, Pe´rez-Castrillo & Veugelers 2008). These developments have created blurred boundaries between academic scientific work and the businesses (Vallas & Lee Kleinman, 2008). This academic entrepreneurship has been hit with criticism by authors that see it as a risk to academic activities (Beck & Young, 2005; Slaughter & Rhoades, 2004).

Miller (1983) was the first to describe entrepreneurial orientation in terms of proactiveness, risk-taking and innovativeness. Large organizations can benefit from doing things in entrepreneurial manner. This approach has also been taken up by many public sector universities that are facing cuts in the public funding. Many see this as beneficial to the general good of the public whereby, academic research is commercialized for the betterment of the society.

William Todorovic, McNaughton, and Guild (2011) stresses that the entrepreneurial orientation constructs as applicable for commercial organizations may not be suitable for organizations like universities that have different cultural and work settings. However, there is research evidence that these entrepreneurial orientation constructs may also vary within commercial organizations (Kropp, Lindsay & Shiham, 2008; Naldi, Nordqvist, Sjoerg & Wiklund, 2007; Coulthard, 2007).

Recently, universities have started taking up direct role in the venture set-ups, establishing business incubators, and university based consulting. It has been found that academic researchers who collaborate more closely with practitioners have higher research performance than those who do not. Thus, there is a wide acceptance of university spin-off and the commercialization of academic research through entrepreneurship (William Todorovic et al, 2011).

Entrepreneurial behavior policies like performance and reward systems are university wide but their interpretation and implementation depends on faculties and departments that have direct influence on faculty's entrepreneurial orientation and activities. University culture characterized by non-cooperative attitude, weak or few incentives, and un-supported infrastructure are some of the barriers to academic entrepreneurial activity and subsequent commercialization of research (Braunerhjelm, 2007).

### 2.3. *Intention to Commercialize*

Research shows that academics and researchers who are part of the research process catering to the needs of the industry are more prone to commercialize their research (Landy et al, 2006; Grandi & Grimaldi, 2005; Prodan, & Drnovsek, 2010). However, Meyer (2006) is of the opinion that commercialization activity of academic research is mostly utilized by small and medium enterprises that are already established and not by the new start-up ventures. He further states that the commercialization activity depends mostly on the national innovation systems that impact academic inventiveness and entrepreneurial activity. However, Wright, Birley and Mosey (2004) opines that for university and academics to commercialize their research, spin-out is the most effective and viable option than to license it to established firms.

The main question why academics prefer to commercialize their research has been answered by Lam (2011). According to her, academics commercialize to get career recognition and advancement, while using the commercial activities to generate fund for their research. For academic scientists, commercialization of their research, acts as an internal motivation factor. Similarly, research has shown that scientists engage in commercial activity of their research mainly for career recognition and advancements (Hong & Walsh, 2009; Krabel & Mueller, 2009).

## 3. Methodology

### 3.1. *Research Goal*

The survey was conducted to find out the entrepreneurial intention and entrepreneurial orientation of both faculty and students towards commercialization of scientific research. For the purpose self administered questionnaire was used in the survey.

### 3.2. *Sample and Data Collection*

The sample consisted of faculty and students of one research university of Malaysia. Various science and engineering departments were contacted for data collection and 100 faculty members and 300 students associated with the faculty in scientific experiments participated in the survey. The sample was taken from amongst the science and engineering departments and the selection criteria adopted was the involvement in scientific research activity. Data Data obtained from those 400 respondents were analyzed through the SPSS statistical package program and proposed relations were tested through regression analyses.

### 3.3. *Instrumentation and Reliability*

Self administered questionnaire was developed for the study. Self report measurement quality has been a concern of many researchers (Weijters, Cabooter, & Schillewaert, 2010; Strizhakova, Coulter, & Price, 2008; Sharma & Weathers, 2003). However, Greenleaf (1992) suggested that response category label and number of response category

may influence the level of respondents' biasness. Thus, to minimize the biasness from respondents forced measurement method was used by adopting a six category response level. The six category labels used were extremely disagree to extremely agree corresponding to 1 and 6 respectively.

The questionnaire comprised of two independent variables of entrepreneurial intention and entrepreneurial orientation and the dependent variable of intention to commercialize. Entrepreneurial intention was measured through 13 items. Entrepreneurial orientation consisted of three dimensions namely innovativeness, proactiveness and risk taking. Innovativeness was measured through 12 items; proactiveness 8 items; and risk-taking 9 items. Intention to commercialize was measured through 5 items. The questionnaire also consisted of demographics which had 10 items. Altogether the questionnaire consisted of 57 items covering demographics, independent variable and dependent variable. The average time clocked for filling up of the questionnaire was approximately 20 minutes. Altogether 400 questionnaires were distributed amongst various science and engineering departments of the university. Appropriately filled questionnaires received were 273 accounting for a response rate of 68.25 percent. Out of 273 questionnaires received 234 belonged to students and 39 were filled by the faculty.

For survey research it is appropriate that the reliability of the scale developed must be reasonable for further statistical analysis. Thus, pilot testing based on a sample of 40 respondents included in the final sample was done. The Cronbach alpha was calculated for inter item consistency which was found to be within the range of 0.70 – 0.90. The alpha reliability for innovativeness was found to be 0.816; proactiveness 0.723; risk taking 0.847; entrepreneurial intention 0.773; commercialization 0.773. Descriptive statistics was obtained for the data set. Descriptive statistics gives the information regarding normality of data by analyzing skewness and kurtosis. The result of descriptive statistics showed that the data is normal as all the values were found to be within acceptable range.

#### *3.4. Demographic Profile*

The demographic profile of the respondents consisted of gender (male 36.3 % and female 63.7 %); in the age category majority of the respondents (83.2 %) were found to be of less than 30 year old whereas 5.6 % were above the age of 50; majority of the respondents belonged to Malay origin and 22.9 % of Chinese origin whereas the rest of the respondents belonged to others category that included Indian and Arab nationalities. Faculty wise distribution of respondents and their educational status was like this engineering 34.2 %, science 43.7 % and social sciences 22.2 %; there were 25 PhDs and the rest of the faculty had done Masters and were pursuing their PhDs. The educational level of students was 92.7 % were pursuing their bachelor degree and majority of them were in either in their 3<sup>rd</sup> year or the 4<sup>th</sup> year of study; 2.6 % were pursuing their master degree whereas 4.7 % were in PhD program.

#### *3.5. Analyses and Results*

The present study was conducted to investigate the entrepreneurial orientation and the entrepreneurial intention of the academic staff and the students of various faculties of Malaysian Research University. To test the role and relationship of entrepreneurial intention and orientation towards commercialization of research correlation matrix was determined. To find out the impact of intention and orientation on commercialization regression analysis was conducted.

The correlation matrix is shown in Table 1. The results indicate that all variables are significantly positively correlated with one another showing that there exist a strong relationship between entrepreneurial intention, entrepreneurial orientation and commercialization of research activity. Entrepreneurial intention is shown to be strongly associated with risk taking propensity of the individuals. Similarly, commercialization is shown to have a strong positive relationship with entrepreneurial intention and risk taking propensity of the individual.

**Table I Correlations Matrix of Variables**

	Innovativeness	Proactiveness	RiskTaking	Entrepreneurial Intention	Commercialization
Innovativeness	1				
Proactiveness	.720**	1			
Risk Taking	.569**	.692**	1		
Entrepreneurial Intention	.449**	.592**	.671**	1	
Commercialization	.416**	.511**	.581**	.532**	1
N	273				

\*\* . Correlation is significant at the 0.01 level (2-tailed).

After establishing that there exists a strong positive relationship among the variables, the second step was to find out how much impact these two independent variables of entrepreneurial intention and orientation have on commercialization of research activity. To ascertain the impact, multiple regression analysis was performed. The results are shown in Table II.

Regression results indicate that both entrepreneurial intention as well as entrepreneurial orientation has a strong influence on commercialization of research. There exist a strong relationship ( $R = 0.610$ ) of all the independent variables with the dependent variable. One of the assumptions of regression is that the observations should be independent. To fulfill this assumption Durbin-Watson test was applied and was found to be within the range. The beta coefficients for the variables showed that entrepreneurial orientation ( $\beta = 0.580$ ;  $t = 6.204$ ,  $p = 0.000$ ) had most influence on commercialization as compared to entrepreneurial intention ( $\beta = 0.418$ ;  $t = 4.283$ ,  $p = 0.000$ ).

**Table II Regression Summary for EI-EO-C Model**

Model	R	R <sup>2</sup>	$\beta$	$t$	Sig.
1	0.610(a)	0.372			
Intercept			-0.249	-0.724	0.470
Ent. Intention			0.418	4.283	0.000
Ent. Orientation			0.580	6.204	0.000

a Predictors: Entrepreneurial Intention, Entrepreneurial orientation

b Dependent Variable: Commercialization

The results of the study indicate that both faculty as well as students has entrepreneurial mind set. Previous research also maintains that educational institutions play a major role in the developing entrepreneurial mind set amongst the students and students are inspired by the faculty that exhibit entrepreneurial attitude and encourage students to be entrepreneurs as well (Kuratko, 2005; Honig, 2004; Carrier, 2005; Lenan & Chen, 2009; Krueger et al. 2000; Lüthje & Franke, 2003, Souitaris et al. 2007).

Further the study shows that commercialization of academic research depends mostly on the entrepreneurial orientation and not just on the intention. The previous research also highlight that academics involve themselves in the commercial activity only to gain acknowledgement and the monetary gains are utilized by the academics to further their research (Lam, 2011; Hong & Walsh, 2009; Krabel & Mueller, 2009). Similarly, students when subjected to intense competitive environment of research activity also show the same attitude towards commercialization. For

students it is the acknowledgement of their innovative work by the academics as well as by the industry and also an opportunity of career as entrepreneurs.

#### 4. Conclusion

The study took into account the entrepreneurial intention and orientation of both the faculty and the students towards commercialization of the research activity. Commercialization of academic research has become one of the most important area of entrepreneurial research, as universities and research institutions alike compete for the public funds. In this scenario universities and research institutions are both actively engaged in research commercialization activity to generate much needed financial resources. Similarly, entrepreneurship is regarded as the most important economic activity for the development of an economy. In this age of globalization and intense competition, entrepreneurial intention and orientation play an important part in the development of entrepreneurship activity within a country. The results of the present study highlight that to commercialize the university research only intention is not enough. Entrepreneurial intention coupled with entrepreneurial orientation is needed for successful commercialization of academic university research.

There are few limitations to the study. The study is limited to only one university. Including more universities and increasing the sample may show different results. Secondly, the student sample is mostly consisted of bachelor students who are in their final years of study. By taking more post graduate students doing their PhDs may also show different results. Thirdly, comparison of various faculties has not been done. It would be interesting to see how different faculties and departments perceive commercialization of research. Another limitation of the study is that university policies regarding development of entrepreneurial skills and attitudes have not been taken into account. Future research may take up university policies like training and development, funding of research activity, cultural values.

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