International Journal of Psychosocial Rehabilitation, Vol. 23, Issue 02, 2019
ISSN: 1475-7192

Entrepreneurship Characteristics and Attitude towards Knowledge Commercialization: Evidence from Malaysia

Mohammed Nawzad Sabir[1], Wirya Najm Rashid[2], Farhad Al-Kake[3] and Bestoon Othman[4*]

Abstract--- *Recently, universities have contributed to the economy of the nation through the central role of research in commercialization and economic development, as well as through traditional teaching and research roles. However, universities must provide an environment for teachers to carry out successful business activities involving technology transfer. The literature shows that there is limited attention in exploring the business characteristics necessary to improve the commercialization of university research teachers. Therefore, to fill this gap, current research seeks to explore the relationship between the business characteristics of university research scholars and the attitude of knowledge marketing. A random sample of 94 teachers from the University of Technology Malaysia were surveyed to determine the relationship between business characteristics (i.e. Self-Confidence, Tolerance of Ambiguity and Uncertainty, Creativity, Self-reliance and the ability to adapt, Opportunity Recognition, Innovativeness and Motivation to Excel). The research results show that leadership and self-confidence are the most important characteristics to increase commercialization. The study found that all these characteristics correlate positively with the commercial attitude of teachers. Therefore, the researcher suggests that university management should improve the business characteristics of teachers to increase the commercialization of research activities.*

Keyword--- *Entrepreneurship Characteristics, Knowledge Commercialization, Attitude, Malaysia*

I. INTRODUCTION

The main role of the university is to conduct scientific research. However, this traditional role has transitioned as a result of the commercialization of research [52]. This commercialization constitutes the market behaviour of the university [4]. Some authors suggest that the commercialization of research means to transfer and development of intellectual property [4]. On the other hand, Othman (2013)[35] extended it to provide consulting services for the main technological innovations of forwarding. Yaacob (2011) emphasizes that marketing translates academic research into products, services and processes that can be subject to business transformations. Li and Morgan (2010) [26] pointed out that although the mission and the primary strength of universities is education and research, from a marketing perspective, there is a great communication gap between industry and academia.

[1]*College of Public Administration and Natural Resource Management, Charmo University*
[2]*Marketing Department, College of Administration and Economics, University of Sulaimani, Iraq and Faculty of Administrative and Financial Sciences, University of Cihan 46001, Sulaimani/Kurdistan, Iraq. E-mail: wirya.najm@sulicihan.edu.krd*
[3]*College of Administration and financial sciences Knowledge University, Iraq. E-mail: Farhad.ali@ue.edu.krd*
[4]**Department of Business Administration, Koya Technical Institute, Erbil Polytechnic University and Universiti Tun Hussein Onn, Malaysia. E-mail: Bestoon2011@yahoo.com*

Received: 15 Feb 2019 | Revised: 14 Mar 2019 | Accepted: 30 Mar 2019

There are few studies on academic marketing in Malaysia [6,20,36, 19]. University researchers have invented innovation through their research activities, and research activities can be commercially exploited. However, converting research into commercial products is a difficult endeavour [20]. The Ministry of Higher Education of Malaysia designated marketing and innovation as a number one niche area, which shows the focus and urgency of the Tenth Plan of Malaysia [31,6]. Aziz et al. (2011) It is assumed that developing countries such as Malaysia is still lagging in terms of research capabilities. In addition, they stressed that universities in Malaysia had been identified as a key determinant of the country's growth and rapid development since the government has invested heavily in public funds for university research activities. However, the proportion of R&D production transfers by Malaysian universities through commercialization is very limited [20]. In this sense, Rashid and Ismail (2014) pointed out that the gap lies in the research and development activities of the university and the transfer to the industry. However, Malaysian universities can only use 6% of the total R&D as commercial products.

The University of Technology Malaysia (UTM) has approximately 2.5% of commercial products such as 118 R&D projects; although it has 47.45% of the possible R&D projects that can be commercialized. Sudullah (2002) [44] pointed out that potential cooperation between universities and industry in Malaysia is passive in Malaysian universities, such as insufficient commercial innovation products, lack of commercialization research, lack of academic beliefs and commitment to innovation and commercialization.

The University of Technology Malaysia (UTM) is a research university focused on graduation and led by innovation with two campuses. One located in Kuala Lumpur (capital of Malaysia) and the other in Johor Bahru (a city in southern Iskandar, Malaysia), a vibrant economic corridor in the southern part of Peninsular Malaysia. UTM has more than 3,500 academic employees, of which more than 250 are foreign graduate teachers. UTM is constantly developing and updating international standards and quality academic and professional programs recognized worldwide. There are more than 15,000 full-time undergraduate students, more than 6,000 part-time students enrolled in distance education programs and more than 9,000 graduate students in various fields of specialization; More than 2,000 foreign students.

UTM has also established a solid reputation through cutting-edge research and innovative education and has been certified by three WIPO national awards. UTM has a stimulating research culture through 10 research consortia (RA) in the strategic disciplines; namely sustainability, information communication, water, cybernetics, biotechnology, architecture, materials and manufacturing, K-economy, energy, Transportation and nanotechnology. In addition to the academic institutions that meet the university's technical education and research needs, there are 28 Centers of Excellence (CoE) [38, 46]

II. LITERATURE REVIEW

A. Commercialization of University Research

Marketing, in terms of the commercialization of university research, is a method of transferring knowledge, skills, manufacturing methods and techniques between universities and institutions to ensure that technology and technology can be developed for a wider range of clients for the development of new products. Procedures, processes, materials or services [54, 56].

Received: 15 Feb 2019 | Revised: 14 Mar 2019 | Accepted: 30 Mar 2019

University commercialization can take many forms and it is important to discuss some of its different implementations. Shane (2004) [40] put forward that patents, copyrights and other legal mechanisms are used to protect the intellectual property that leads to spinoffs, while at other times the intellectual property that leads to spinoff company formation takes the form of knowhow or trade secrets. These mechanisms could be used in various ways that are not necessarily indicative of whether research is university-based. The procedure to commercially utilize research can vary broadly. According to Buenstorf and Geissler (2012) the procedure can include licensing contracts or setting up partnerships and joint ventures to share both the rewards and risks of commercializing new technologies to industries. However, the main goal of commercialization is to take important scientific results and make them into suitable products for market [9].

B. Entrepreneurial Characteristics

Entrepreneurs have many definitions, and no simple definition is often considered "correct", because the scope of meaning encompasses everything from the entrepreneur to the application of business skills and abilities in almost any context [14]. Several studies have been carried out to understand the characteristics of entrepreneurs and explain the function of these characteristics. The psychological or traditional approach to business research may be the most widely represented field of literary research. The feature approach focuses on individual personal trends and their characteristics [33]. It is considered that there are social, anxiety and energy characteristics in the people who apply them [33] and that distinguish entrepreneurs from other individual groups [51]. To Gibson and others. (2014), entrepreneurs are seen as the basic unit of analysis and entrepreneurship. "The characteristics and characteristics are the key to explain to entrepreneurs as a phenomenon. The traits and individuality of entrepreneurial research consider that entrepreneurs are the cause of entrepreneurial activities. The characteristics and personality of the family must have an impact Explanatory in business activities.

Characteristics of successful entrepreneurs have been examined in many studies to develop personality profiles for entrepreneurs and have been found common in majority of the studies [48,14,15,17]. Entrepreneurial characteristics such as opportunity obsession, creativity, ambiguity and uncertainty, self-reliance, motivation to excel, optimistic, has been taken as major characteristics of entrepreneurs [48]. Numerous studies have highlighted that characteristics of entrepreneurs can be acquired by birth, through life experiences, or through entrepreneurial processes and education [14]. Researchers are of the opinion that entrepreneurial characteristics are universal in nature and should be developed at early stage of education to enhance entrepreneurial talents [15]. Table 1 provides the summary of literature available on the entrepreneurial characteristics. Literature has emphases on the six characteristics of the successful entrepreneurs. These characteristics are tolerance of ambiguity and uncertainty, self-confidence, creativity, self-reliance and ability to adapt, innovativeness, motivation to excel, opportunity recognition.

Received: 15 Feb 2019 | Revised: 14 Mar 2019 | Accepted: 30 Mar 2019

Table 1: Summary of Literature on Entrepreneurial Characteristics

Author/ Characteristics	**TAU**	**SC**	**CSAA**	**IN**	**OR**	**ME**
Mullins (2002) [32]		X				
McCarthy (2000) [29]	X					
Timmons and Spinelli (2009) [47]			X			
Zhao, Seibert and Hills (2005) [55]						X
Collura and Applegate, 2000 [10]	X		X			X
Teoh and Foo (1997) [45]	X					
Good, 2003 [18]		X				
Tushman and O'Reilly, 2013 [49]			X			
Andries and Debackere, 2006 [4]			X			
Kenney and Patton (2011) [22]				X		
Mirela, 2008 [30]				X		
Baron, 2006 [7]					X	
Longenecker et al. (2006) [27]					X	
Shane and Venkataraman (2000) [41]					X	
Zacharakis, 2006 [53]						X

Note: CSAA= Creativity, Self Reliance and ability to adapt, TAU= Tolerance of Ambiguity and Uncertainty, OR= Opportunity Recognition, SC=Self Confidence, IN= Innovativeness, ME=Motivation to excel.

C. Attitude towards Commercialization

Past researches indicate that attitudes of individuals are precursors to their behaviors and external factors influence attitude and intentions of individuals [1]. It has also been ascertained that negative attitude towards entrepreneurial activities result in failure of such activities [25,16]. Goel et al. (2007) have highlighted that presence of informal networks to support entrepreneurial activity along with social channels of communication would lead to higher entrepreneurial attitude among individuals.

Attitudes play a vital role towards success of entrepreneurial activities as it helps in building disciplined, persistent, committed behaviors among individuals [47]. However, attitudes vary from one individual to another on attractiveness of entrepreneurial activities; understanding of such attitudes can be instrumental in assisting the policy direction and in encouraging entrepreneurship [8]. Bosma and Levie (2009) also highlight that the most relevant attitudes towards entrepreneurship includes willingness to bear risk and individuals perceptions of their own skills, knowledge and experience. In addition, positive attitude towards entrepreneurship not only create support, but also

help in gathering financial resources and networking benefits for those involved in entrepreneurial activities and for those who are willing to engage in entrepreneurial activities.

D. The Relationship between Entrepreneurial Characteristics and Attitude towards Knowledge Commercialization

Oshea and others. (2008) emphasizes that the size and nature of the financial resources allocated to universities affect academic entrepreneurship. This means that greater industrial financing will attract more academics to market their innovations. Shane (2004) argues that the nature of financing attracts opportunities for the commercialization of technology and the tendency of the academy to participate in the transfer of technology, which can vary from one field to another. Oshea and others. (2008) emphasizes the personality of the entrepreneur and his personal skills, and is of great importance in the configuration of personal business behavior. Similarly, Muslim et al. (2020)discovered that academic entrepreneurs with outgoing personality are more likely to participate in business activities. He concluded that personal characteristics, such as achievement needs, independent desires and internal control points, forced academics to become entrepreneurs.

University marketing activities are a reflection of institutional behavior. Universities with a corporate culture support marketing rather than universities that do not support culture [34]. Aini et al., (2020) [2]also argues that university social norms and expectations are key determinants of marketing activities, citing the example of MIT; points out that the acquiescence of MIT to entrepreneurs is a key factor in explaining successful marketing activities. . Jain et al. (2009) [21] also supports this argument and emphasizes that the activities derived from Columbia University are partly due to the loss of knowledge provided by academic entrepreneurs. In contrast, university environments that discourage entrepreneurship have been shown to inhibit commercialization [34]. The attitudes and behaviors of supervisors, such as department heads, have intensified the lack of academic will to participate in business activities. Jain et al. (2009) emphasizes that group norms are important for predicting technology transfer activities and that individuals are affected by their direct peer behavior. Another reason why universities do not support business culture is the incentive and incentive problems and possible conflicts between institutional rewards for research publications and commercial property returns.

Researchers like [3]is of the view that academic researchers ‘attitude towards commercialization has evolved from opposition to acceptance of entrepreneurial activities. Jain et al. (2009) are of the opinion that researchers ‘participation in broad commercialization activity including patenting, licensing, industry research, consulting of the formation of a start-up is mainly due to their entrepreneurial orientation and attitude towards entrepreneurial activities. Similarly, researchers have highlighted that local context is important for enhancing researchers ‘and scientists attitude towards commercialization activities[5].

One of the constraints towards successful commercialization is the attitude of the researchers who conduct non-profit oriented research [5] and are only concerned with purely the academic value [11]. Goel et al. (2007) have highlighted that to enhance entrepreneurial attitude among individuals, institutional efforts and support such as

creating conducive environment and incentive structures have to be more directed to the individuals to bring them out of mindset of not taking up such activity. Study concludes the discussion in the following hypothesis:

H1: Entrepreneurial characteristics would have a significant relationship with academics attitude towards knowledge commercialization.

Commercialization of university research is also demand high tolerance from the entrepreneurs who engaged in commercialization process[17]. Academic entrepreneur need to exhibit high tolerance of ambiguity and uncertainty for successful commercialization of knowledge. Fathi (2014) argued that entrepreneurs with tolerance of risk, ambiguity and uncertainty should be viewed as people who are capable of sustaining their commitments and determined to continue with a course of action, even when the results seem uncertain. Thus tolerance is essential characteristic required for the commercialization. Thus study concluded it in hypothesis:

H1a: Tolerance of ambiguity and Uncertainty significantly influence academics attitude towards knowledge commercialization.

Many studies have emphasized the assertive role of academic researchers in marketing [43]. According to Etzkowitz (2002) [13], the attitudes of academics towards business participation have gone from opposition to non-compliance to acceptance. In addition, the confidence of academic entrepreneurs is often used to describe the participation of university scientists in the creation of new companies related to their inventions [40,43]. Therefore it can be deduced:

H1b: Self-confidence significantly influence academics attitude towards knowledge commercialization.

Academic researchers often associate with people with the highest academic level of technical qualifications. Higher academic qualifications, combined with extensive research experience, means that the academic community has been developing scientific experience and technical skills to become experts in specific technical fields. High-tech skills and outstanding research results are considered to be the ability of researchers to invent, innovate and promote the development of technologically advanced products [11]. These capabilities are critical and are the starting point for the commercialization of emerging technologies. In fact, many empirical studies in the past have shown how the participation of academic researchers in commercial activities is greatly influenced by their creativity, self-sufficiency and adaptability (Deeds et al., 2005, 24]. Therefore, the study proposes the hypothesis:

H1c: Creativity, self-reliance and ability to adapt would significantly influence academics attitude towards knowledge commercialization.

The marketing process begins with the identification of business opportunities and then enters creative foundations and applied research to generate innovation. Innovations in products, processes, methods, etc. enter the market in the company. Entrepreneurship and marketing are the final stages of the marketing process. In the final stage, the university must decide on a marketing strategy. Because universities are the best place to implement innovation, innovation cannot be studied independently of the organization that produces or adopts innovation [23]. Malaysia announced that they intend to use this country as a regional educational center[42]. This was foreseen in the National Strategic Plan for Higher Education 2020, when the government described seven main reform

objectives: expand access and improve quality; improve the quality of teaching; strengthen research and innovation; strengthen higher education institutions and strengthen internationalization; The culture of lifelong learning; and finally, the delivery system of the Ministry of Higher Education [31] was strengthened [42]. Thus it has been proposed:

H1d: Innovativeness would significantly influence academics attitude towards knowledge commercialization.

Previous studies on the relationship between academic attribution of entrepreneurship and commercialization have emphasized that the motivations and tendencies to participate in applied research are business characteristics that will increase the probability of commercial success [28]. The commercialization of emerging technologies is a long and challenging process that requires academic entrepreneurs to be more than just discovering technological opportunities and taking advantage of commercial opportunities [11]. They need to demonstrate their creativity and self-sufficiency and adapt to the changing needs and needs of the entire industry and society.

Only when academic researchers develop these characteristics, their attitude towards commercialization is positive and will they participate in commercial activities. Motivation is an important feature in the commercialization of university research. Therefore, the study proposes the hypothesis:

H1e: Motivation to excel significantly influence academics attitude towards knowledge commercialization.

In a knowledge-based economy, universities are experiencing tremendous changes. Its mission and functions have changed due to new emerging expectations, new demands, competitive markets for the innovative production of knowledge and technology, and the integration of information technology in the university environment. In particular, the dynamics and behavior of university research have become more sensitive to opportunities for industry cooperation, commercial use and increasingly interdisciplinary. There is a growing interest in academic research to analyze the process of academic participation in marketing and its economic and social consequences. Some studies have shown that the success of marketing depends largely on the recognition of new opportunities by academic entrepreneurs [57]. Academic entrepreneurship activities include: industry-university cooperation, university risk fund, company. So study formulated hypothesis:

H1f: Opportunity recognition significantly influence academics attitude towards knowledge commercialization.

E. Conceptual Framework of the Study

The present study investigates the relationship between entrepreneurial characteristics and entrepreneurial attitude of academic researchers towards commercialization in UTM (see figure 1). The elements are aimed at examining the connexion amongst the entrepreneurial characteristics with Attitude towards Knowledge Commercialization.

Received: 15 Feb 2019 | Revised: 14 Mar 2019 | Accepted: 30 Mar 2019

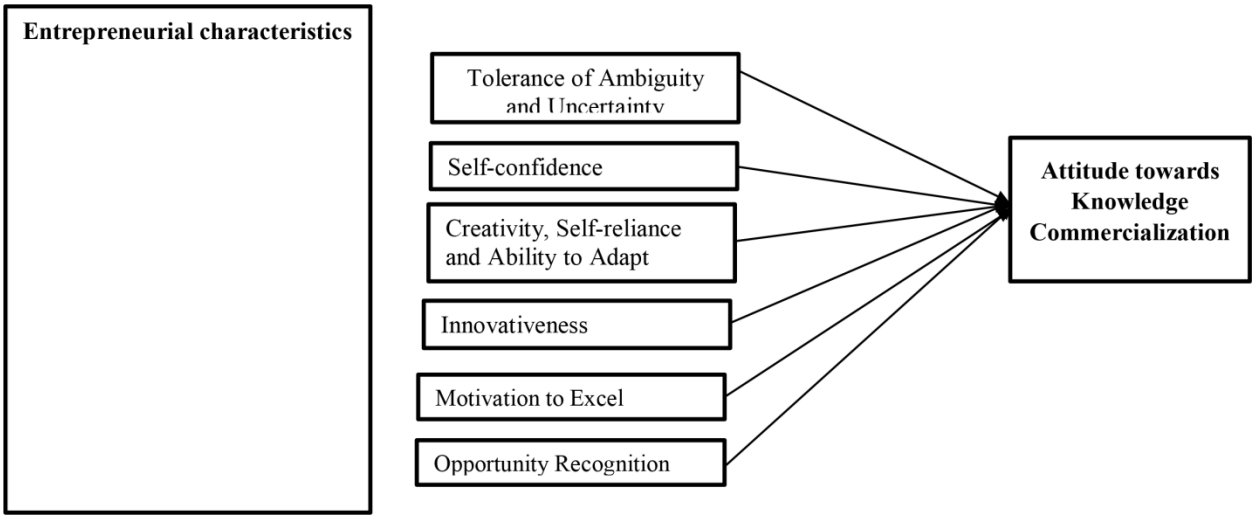

Figure 1: Framework of Study

III. METHODOLOGY

The present study investigates the relationship between entrepreneurial characteristics academics attitude towards knowledge commercialization in UTM. To analyze the relationship, research questions have been formulated based on the objectives of the study. For the present study targeted a sample of 230 respondents. Total 230 questionnaires were distributed to the academic staff of UTM. The number of sample for each faculty is based on the percentage strength of the faculty. The respondents for the study were selected using simple random technique. The researcher would acquire the name list of all faculty members from the website and according to the random table would select each respondent. If any respondent is unwilling to participate in the study replacement was made from the list of faculty members. The present study is descriptive in nature employing hypothesis testing. The completed questionnaire was collected and data was entered into SPSS version 21 for the purpose of analysis. Hypotheses have been formulated on the relationships exhibited in the model of the study. Data was collected through survey instrument adopting cross sectional approach [39]. The use of survey method is the most convenient method of collecting the information from a population in a short time and with the least budget [39].

IV. RESULTS AND ANALYSIS

A. Reliability

Reliability is the main requirement of any research as it gives confirmation regarding consistency of the results of the survey instrument. It is calculated through Cronbach alpha reliability statistics [39, 37]. In the present study the researcher has also calculated item wise reliability of the questionnaire through Cronbach alpha. Table 2 shows that all values are above the acceptable limit of 0.70 [37].

Received: 15 Feb 2019 | Revised: 14 Mar 2019 | Accepted: 30 Mar 2019

Table 2: Reliability of the Research Instrument

Sr.	Variable	No of items	Alpha
1	TAU	3	0.755
2	SC	3	0.738
3	CSAA	7	0.793
4	IN	4	0.808
5	OR	3	0.745
6	ATKC	5	0.729

TAU= Tolerance of Ambiguity and uncertainty, SC=Self Confidence, CSAA= Creativity, Self-Reliance and ability to adapt, IN= Innovativeness, ME=Motivation to excel, OR= Opportunity Recognition, ATKC= Attitude towards Knowledge Commercialization.

Table 2 shows that the values of Cronbach alpha for all the variables of the study such as Innovativeness, Creativity, Self-Reliance and ability to adapt, and Tolerance of Ambiguity and uncertainty (0.808, 0.793, 0.755) are fall within the acceptable level of 0.70. Hence, the data are reliable and can be used for further analysis.

B. Demographic Profile

The respondents of the study consisted of 230 faculty members working in different faculties in UTM. Questionnaires that have been returned to the researcher were 94 which have been used for final analysis. The survey instrument consisted of three sections. The third section is based on the collection of the data regarding demographic details of the respondents. Respondents have been asked various items like designation, faculty, department, age, gender, education level, experience etc.

The results of the demographic analysis of age, gender and education level is presented in Table 3.

Table 3: Demographic Profile

Sr.	Variable		Frequency	Percentage	Frequency
1	Age	31 - 35 years	15	15.9	94
		36-40 years	23	24.4	
		40 and above	56	59.57	
2	Gender	Male	51	54.25	94
		Female	43	45.75	
3	Education Level	Masters	11	11.70	94
		Ph.D	83	88.29	

4	Work Experience	5 years and less	5	5.31	94
		6-10 years	13	13.82	
		11-15 years	16	17.02	
		16-20 years	10	10.6	
		21 years and above	50	53.1	
5	Research Experience Industrial	Yes	50	53.1	94
		No	44	46.80	
	N		94		

C. Correlation Analysis between Entrepreneurship Characteristics and Academic Attitude towards Commercialization

It was mandatory to test strength of relationship between the constructs prior to apply multi variate regression analysis [39]. Thus, study tested relationships of entrepreneurial characteristics (tolerance of ambiguity and uncertainty, self-confidence, creativity, self-reliance and ability to adapt, innovativeness, motivation to excel and opportunity recognition) and academic attitude towards knowledge commercialisation using correlation analysis. The researcher has checked the relationship of each entrepreneurship characteristic with academic attitude towards knowledge commercialization through Pearson Correlation. The results in Table 4 show that all entrepreneurship characteristics (tolerance of ambiguity and uncertainty, self-confidence, creativity, self-reliance and ability to adapt, innovativeness, motivation to excel and opportunity recognition) are positive and significant relationship with academic attitude towards knowledge commercialization. The results indicate that creativity, self-reliance and ability to adapt ($r = 0.480$, $p < .000$) and opportunity recognition ($r = 0.400$, $p = < .000$) have comparatively stronger relationship with academic attitude towards commercialization. Similarly, Innovativeness ($r = 0.385$, $p < .000$) have moderate significant relationship with academic attitude towards commercialization, while the relationships of tolerance of ambiguity and uncertainty ($r = .232$, $p < .024$),self-confidence ($r = .196$, $p < .048$) and motivation to excel ($r = .272$, $p < .008$) have weaker relationship with academic attitude towards knowledge commercialization.

Table 4: Relationships between Entrepreneurship Characteristics and Academic Attitude towards Commercialization

	TAU	**SC**	**CSAA**	**IN**	**ME**	**OR**	**ATKC**
TAU	1						
SC	.095 .364	1					
CSAA	.319** .002	.465** .000	1				

Received: 15 Feb 2019 | Revised: 14 Mar 2019 | Accepted: 30 Mar 2019

IN	.240* .020	.361** .000	.476** .000	1			
ME	.188 .069	.010 .927	.099 .344	.145 .163	1		
OR	.389** .000	.535** .000	.712** .000	.681** .000	.435** .000	1	
ATKC	.232* .024	.196* .048	.480** .000	.385** .000	.272 .008	400** .008	1

TAU= Tolerance of Ambiguity and uncertainty, SC=Self Confidence, CSAA= Creativity, Self Reliance and ability to adapt, IN= Innovativeness, ME=Motivation to excel, OR= Opportunity Recognition, ATKC= Attitude towards Knowledge Commercialization.

D. Hypotheses Testing between All Entrepreneurial Characteristics and Attitude towards Knowledge Commercialization

Last phase of the data analysis was hypotheses testing using regression analysis. Below table 5 depict the model summary for the regression analysis. R square value was ranging 0.227 to 0.612; this explains the variation in the attitude towards knowledge commercialization could be predicted through the entrepreneurial characteristics (tolerance of ambiguity and uncertainty, self-confidence, creativity, self-reliance and ability to adapt, innovativeness, motivation to excel and opportunity recognition).

The ANOVA results for the regression analysis. F statistics indicated that the value of systematic variation is higher than the value of unsystematic variation. Thus, model is fit enough to depicts the results truly, as f statistics was ranging 3.92 to 13.51 with significance at $p<0.05$.

Table 5 shows the regression results between the independent variables i.e. entrepreneurial characteristics (tolerance of ambiguity and uncertainty, self-confidence, creativity, self-reliance and ability to adapt, innovativeness, motivation to excel and opportunity recognition) and dependent variable i.e. attitude towards knowledge commercialization. Table 5 indicates that all entrepreneurial characteristics (tolerance of ambiguity and uncertainty, self-confidence, creativity, self-reliance and ability to adapt, innovativeness, motivation to excel and opportunity recognition) significantly associated with attitude towards commercialization of knowledge.

Table 5: Regression analysis

Model	Unstandardized Coefficients		t value	Sig.	F	R^2
	B	Std. Error				
TAU	0.383	0.19	2.02	0.026	6.17	0.351

SC	0.316	0.069	4.58	0.000	5.12	0.243
CSAA	1.404	0.548	2.56	0.012	13.51	0.491
IN	0.644	0.301	2.14	0.035	8.52	0.371
OR	0.377	0.143	2.64	0.000	3.92	0.227
ME	0.216	0.06	3.6	0.000	4.23	0.291
a. Dependent Variable: ATKC						

TAU= Tolerance of Ambiguity and uncertainty, SC=Self Confidence, CSAA= Creativity, Self Reliance and ability to adapt, IN= Innovativeness, ME=Motivation to excel, ORM= Opportunity Recognition, EC= entrepreneurial characteristics

Regression coefficient value of TAU was 0.383 with standard error of 0.190 and t value 2.02. This value is significant having p value 0.026 ($p<0.05$). Thus, study established a positive relation between TAU and ATKC. So, hypothesis H1a: Tolerance of ambiguity and Uncertainty significantly influence academics attitude towards knowledge commercialization in UTM had been accepted. Regression coefficient value of SC was 0.316 with standard error of 0.069 and t value 4.58. This value is significant having p value 0.000 ($p<0.05$). Thus, study established a positive relation between SC and ATKC. So, hypothesis H1b: Self-confidence significantly influence academics attitude towards knowledge commercialization in UTM had been accepted. Study claims positive relation between the CSAA and ATKC, regression coefficient value of CSAA was 1.404 with standard error of 0.548 and t value 2.56. This value is significant having p value 0.012 ($p<0.05$). So, hypothesis H1c: Creativity, self-reliance and ability to adapt would significantly influence academics attitude towards knowledge commercialization in UTM had been accepted. Regression coefficient value of IN was 0.644 with standard error of 0.301 and t value 2.14. This value is significant having p value 0.035 ($p<0.05$). Thus, study established a positive relation between IN and ATKC. So, hypothesis H1d Innovativeness significantly influence academics attitude towards knowledge commercialization in UTM had been accepted.

Regression coefficient value of OR was 0.377 with standard error of 0.143 and t value 2.64. This value is significant having p value 0.000 ($p<0.05$). Thus, study established a positive relation between OR and ATKC. So, hypothesis H1e: Opportunity recognition significantly influence academics attitude towards knowledge commercialization in UTM had been accepted. Regression coefficient value of ME was 0.216 with standard error of 0.060 and t value 3.60. This value is significant having p value 0.000 ($p<0.05$). Thus, study established a positive relation between ME and ATKC. So, hypothesis H1f: Motivation to excel has a significant influence on academics attitude towards knowledge commercialization in UTM had been accepted.

Received: 15 Feb 2019 | Revised: 14 Mar 2019 | Accepted: 30 Mar 2019

Table 6: Summary of the hypotheses

Sr No	Hypotheses	Results
H1a	Tolerance of ambiguity and Uncertainty would significantly influence academics attitude towards knowledge commercialization in UTM.	Supported
H1b	Self confidence would significantly influence academics attitude towards knowledge commercialization in UTM.	Supported
H1c	Creativity, self reliance and ability to adapt would significantly influence academics attitude towards knowledge commercialization in UTM.	Supported
H1d	Innovativeness would significantly influence academics attitude towards knowledge commercialization in UTM.	Supported
H1e	Motivation to excel would significantly influence academics attitude towards knowledge commercialization in UTM.	Supported
H1f	Opportunity recognition would significantly influence academics attitude towards knowledge commercialization in UTM.	Supported

V. DISCUSSION OF THE STUDY

The first research objective of this study is to identify the entrepreneurship characteristics among academicians in Universiti Teknologi Malaysia (UTM). A series of descriptive statistics and inferential statistics have been conducted, followed by multiple regressions to investigate the effect of (ECs) on academic attitudes towards commercialization. This could be inferred that all the variables of the study fall within the range of the scale. These values confirm the validity of the data. Furthermore, the mean values of all the variables show that majority of the respondents are experiencing or using these entrepreneurial characteristics. The mean values of the one dimension self-confidence (4.085) indicate that respondents experience more positively these characteristics than the other characteristics while the mean values of opportunity recognition (3.426) and attitudes towards commercialization (3.575) show that respondents view these characteristics neutrally means that they are experiencing these characteristics less than other characteristics. However, the overall results of the descriptive statistics show that faculty members experiencing all these entrepreneurial characteristics in their professional life.

The most prominent entrepreneurial characteristics component are self-confidence in this study. Recognizing and believing abilities to achieve set goals, and bravery to encounter with setbacks and even failures but keep trying inspire self-confidence characteristic. Beside, ensuring encouragement for researchers to state what they have in their minds and founding trust among group members for the purpose of successful collaboration lead to enhance self-confidence. Among entire entrepreneurship characteristics, self-confidence have greatly contributed to the academic attitudes towards commercialization in the respondents ‘viewpoints.

In addition, similar results of the entrepreneurship characteristics according to Drucker (2006) [12] has been conducted which focus more on the distinct ability of entrepreneurs to see opportunities that others do not by the virtue of self-confidence. In general the finding supports previous findings that claimed self-esteem is a crucial

antecedent to academic attitudes towards commercialization [1]. The result suggests that academic attitudes can be impressed through the entire eleven ECs.

Attitudes play a vital role towards success of entrepreneurial activities as it helps in building disciplined, persistent, committed behaviors among individuals [47]. The research highlights that academic members attitude towards commercialization would increase if their peers in the departments have experienced commercialization themselves or have worked in commercial setting [43]. Van Wyk and Boshoff (2004) [50] have pointed out that entrepreneurial behavior results from subjective association behavior of an individual towards certain attributes. They highlight that entrepreneurial attitude is based on three theoretical attitudinal components of beliefs and thoughts, positive or negative affection, and intentions and actions.

VI. CONCLUSION

The conclusions drawn from this study indicates that there are a few considerations that the university managers and head executive of institutes need to apply into their programs when they have strategies to increase knowledge commercialization. Basic concept of the universities is considered to generate knowledge through teaching and research. However, now the focus of the universities is shifted to the dissemination of the generated knowledge. So recently universities are acknowledged as commercialization centers of the knowledge and hence universities are playing a third role of commercialization beside the teaching and research. Universities are producing economic activities and providing opportunities for the entrepreneurial activities. It is important for the management of the universities to understand what characteristics of entrepreneurs are important in order to build a proactive attitude of the staff towards the commercialization of the knowledge. The most prominent entrepreneurial characteristics components are self-confidence and leadership according to the finding of the study. Thus study suggested to the management to enhance the confidence of the staff and encourage them by providing leader support to initiate for the commercialization of the knowledge.

REFERENCES

[1] Abreu, M. and Grinevich, V. (2013). The Nature of Academic Entrepreneurship in the UK: Widening the Focus on Entrepreneurial Activities. Research Policy 42, 408– 422.

[2] Aini Muslima, Amran Haruna*, Darbaz Ismaelb and Bestoon Othmanc, and AFaculty. “Social Media Experience, Attitude and Behavioral Intention towards Umrah Package among Gener- Ation X and Y.” *Management Science Letters*, vol. 10, no. 1, 2020, pp. 1–12, doi:10.5267/j.msl.2011.05.007.

[3] Amran, Harun;, et al. “Understanding Experienced Consumers towards Repeat Purchase of Counterfeit Products: The Mediating Effect of Attitude.” *Management Science Letters*, vol. 10, 2019, pp. 13–28, doi:10.5267/j.msl.2019.8.019.

[4] Andries, P and Debackere, K. (2006). Adaptation in New Technology-Based Ventures: Insights at the Company Level. International Journal of Management Reviews, 8 (2), 91–112.

[5] Arvanitis, S., and Woerter, M. (2012). Exploration or Exploitation of Knowledge from Universities: Does it Make a Difference? (No. 322). KOF Working Papers, KOF Swiss Economic Institute, ETH Zurich.

[6] Aziz, K., Harris, H. and Norhashim, H. (2011). University Research, Development and Commercialisation Management: A Malaysian Best Practice Case Study. World Review of Business Research, 1(2), 179 – 192.

[7] Baron, R. (2006). Opportunity Recognition as Pattern Recognition: How Entrepreneurs "Connect the Dots" to Identify New Business Opportunities. Academy of Management Perspectives, February, 104-119

[8] Bosma, N. and Levie, J. (2009). The Global Entrepreneurship Monitor Global Report. University Desarrollo, Santiago, Chile.

Received: 15 Feb 2019 | Revised: 14 Mar 2019 | Accepted: 30 Mar 2019

[9] Buenstorf, G., and Geissler, M. (2012). Not Invented Here: Technology Licensing, Knowledge Transfer and Innovation Based on Public Research. Journal of Evolutionary Economics, 22(3), 481-511.

[10] Collura, M and Applegate, L.M. 2000. Entrepreneurial Mindset Tool: Building E-Businesses. Retrieved from:

[11] Deste, P., and Perkmann, M. (2011). Why do Academics Engage with Industry? The Entrepreneurial University and Individual Motivations. The Journal of Technology Transfer, 36(3), 316-339.

[12] Drucker, P. (2006). Innovation and Entrepreneurship. New York: Harper Collins Publishers.

[13] Etzkowitz, H. (2002). MIT and the Rise of Entrepreneurial Science. Routledge, New York

[14] Fathi, R. (2014). The Effect of Entrepreneurship Education on Business Intelligence of Management Students of Islamic Azad University of Elam.International Letters of Social and Humanistic Sciences, (19), 24-34.

[15] Gibson, S. G., Harris, M. L., Walker, P. D., and McDowell, W. C. (2014). Investigating the Entrepreneurial Attitudes of African Americans: A Study of Young Adults. Journal of Applied Management and Entrepreneurship, 19(2), 107-125.

[16] Goel, A., Vohra, N., Zhang, L., and Arora, B. (2007). Attitudes of the Youth Towards Entrepreneurs and Entrepreneurship: A Cross-Cultural Comparison of India and China. Journal of Asia Entrepreneurship and Sustainability, 3(1), 29-63.

[17] Goldstein, H., Bergman, E. M., and Maier, G. (2013). University Mission Creep? Comparing EU and US Faculty Views of University Involvement in Regional Economic Development and Commercialization. The Annals of Regional Science, 50(2), 453-477.

[18] Good, S.W. (2003). Building a Dream: A Canadian Guide to Starting Your Own Business. 5ed. Canada, Toronto: McGraw-Hill Ryerson Limited.

[19] Heng, L. H., Rasli, A. M., and Senin, A. A. (2011). Enhancing Academic Researchers‘ Perceptions Towards University Commercialization. International Journal of Economic Research, 2(5), 33-48.

[20] Ismail, K., Senin, A. A., Mun, S. W., Chen, W. S., and Musibau, A. A. (2012). Decision Making Process in the Commercialization of University Patent in Malaysia. Afr. J. Bus. Manage, 6(2), 681-689.

[21] Jain, S., George, G., and Maltarich, M. (2009). Academics or Entrepreneurs? Investigating Role Identity Modification of University Scientists Involved in Commercialization Activity. Research Policy, 38(6), 922-935.

[22] Kenney, M., and Patton, D. (2011). Does Inventor Ownership Encourage University Research-Derived Entrepreneurship? A Six University Comparison. Research Policy, 40(8), 1100-1112.

[23] Kimberly, J. R. (1986). The Organizational Context of Technological Innovation. Managing Technological Innovation, 23, 43.

[24] Landry, R., Amara, N., and Ouimet, M. (2007). Determinants of Knowledge Transfer: Evidence from Canadian University Researchers in Natural Sciences and Engineering. The Journal of Technology Transfer, 32(6), 561-592.

[25] Lee, L., Chua, B. L., and Chen, J. (2004). Antecedents for Entrepreneurial Propensity and Intention: Findings from Singapore, Taiwan, and Hong Kong (Working Paper). Singapore: National University of Singapore Entrepreneurship Centre.

[26] Li, C., Morgan, G. (2010). From Knowledge to Product. Institutional Change and Commercialization of University Research in China. Journal of Sci. Tech. Policy China, 1(3), 254-274.

[27] Longenecker, J.G., Moore, C.W. and Petty, J.W. (2006). Small Business Management: An Entrepreneurial Emphasis, 13th ed. Mason, Ohio: South Western College Publishing.

[28] Marion, T. J., Dunlap, D. R., and Friar, J. H. (2012). The University Entrepreneur: A Census and Survey of Attributes and Outcomes. R&D Management, 42(5), 401-419.

[29] McCarthy, B. (2000). Researching the Dynamics of Risk-taking and Social Learning: An Exploratory Study of Irish Entrepreneurs. Irish Marketing Review, 13(1), 46-60.

[30] Mirela, B. (2008). Innovation - The Characteristic Tool Of Entrepreneurs [online]. Retrieved from http://steconomice.uoradea.ro/anale/volume/2008/v4-management-marketing/1000.pdf.

[31] MOHE (2010). Niche 1: Commercialization and Innovation Development, AKEPT (Higher Education Leadership Academy) Centre For Leadership Research and Innovation, Putrajaya (www.mohe. gov.my).

[32] Mullins, L.J. (2002). Management and Organizational Behaviour. 6th ed. Financial Times, Prentice Hall, 434-435.

[33] Nandram, S., and Samsom, K. (2007). Entrepreneurial Behavior: New Perspectives Gained through the Critical Incident Technique (No. 07-04). Nyenrode Business Universiteit.

[34] Oshea, R. P., Chugh, H. and Allen, T. J. (2008). Determinants and Consequences of University Spin-Off Activity: a Conceptual Framework. Journal of Technology Transfer, 33, 653–666.

[35] Othman, B. (2013). The Influence Of Technology Acceptance Model On Behavioral Intention To Use Internet Banking System. Universiti Teknologi Malaysia, (January 2013).

[36] Rashid, W. N., and Ismail, K. (2014). The Role of Entrepreneurial Leaders towards Commercialization of University Research. Journal of Basic and Applied Sciences, 4(6), 183-196.

[37] Saunders, M., Lewis, P., and Thornhill, A. (2009). Research Methods for Business Students (5th ed.). Harlow, England: Prentice hall.

[38] Schumpeter, J. A. (1934). The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle. Translated by Redvers Opie. Oxford University Press.

[39] Sekaran, U. (2003). Research Methods for Business: A Skill Building Approach. (4th Edition). New York: John Wiley and Sons Inc.

[40] Shane, S. (2004). Encouraging University Entrepreneurship? The Effect of the Bayh-Dole Act on University Patenting in the United States. Journal of Business Venturing, 19(1), 127-151.

[41] Shane, S., and Venkataraman, S. (2000). The Promise of Entrepreneurship as a Field of Research. Academy of Management Review, 25(1), 217-226.

[42] Sirat, M. B. (2010). Strategic Planning Directions of Malaysia‘s Higher Education: University Autonomy in the Midst of Political Uncertainties. Higher Education, 59(4), 461-473.

[43] Stuart, T. E., and Ding, W. W. (2006). When do Scientists Become Entrepreneurs? The Social Structural Antecedents of Commercial Activity in the Academic Life Sciences1. American Journal of Sociology, 112(1), 97-144.

[44] Sudullah, A. F., (2002). Commercialization of Research Results: Issue and Challenge USM Frontiers: Buletin of R&D. 1(1), 10-11.

[45] Teoh, H. Y., and Foo, S. L. (1997). Moderating effects of Tolerance for Ambiguity and Risktaking Propensity on the Role Conflict-Perceived Performance Relationship: Evidence from Singaporean Entrepreneurs. Journal of Business Venturing, 12(1), 67-81.

[46] Thursby, J. G., Fuller, A. and Thursby, M. C. (2009). US Faculty Patenting: Inside and Outside the University. Research Policy, 38 (1), 14–25.

[47] Timmons, J.A. and Spinelli, S. (2009). New Venture Creation Entrepreneurship for the 21st Century (8th ed.) Boston, MA: McGraw-Hill.

[48] Timmons, J.A., Spinelli, S and Ensign, P. (2010). New Venture Creation: Entrepreneurship for the 21st Century. Canada: McGraw-Hill Ryerson.

[49] Tushman, M. L., and O'Reilly, C. A. (2013). Winning Through Innovation: A Practical Guide to Leading Organizational Change and Renewal. Harvard Business Press.

[50] Van Wyk, R. and Boshoff, A.B. (2004). Entrepreneurial Attitudes: A Distinction between Two Professional Groups. South African Journal of Business Management, 35(2), 33-38.

[51] Westhead, P and Wright, M. (2000). Advances in Entrepreneurship. Vol.1, UK: Edward Elgar Publishing Limited.

[52] Yaacob, N.A. (2011). Issues of Commercialization of Biotechnology Related Researchers in Malaysian Research Universities. (Ph.D. Dissertation). UniversitiTeknologi Malaysia, Malaysia.

[53] Zacharakis, A. (2006). Who's an Entrepreneur? Retrieved from http://homepage.cem.itesm.mx/maria.fonseca/master/documents/WhosEnt.pdf.

[54] Zhao, F. (2004). Commercialization of Research: A Case Study of Australian Universities. High. Educ. Res. Dev., 23(2), 223-236.

[55] Zhao, H., Seibert S.E and Hills, G.E. (2005). The Mediating Role of Self-Efficacy in the Development of Entrepreneurial Intentions. Journal of Applied Psychology, 90(6), 1265–1272

[56] Zimmerer T.W and Scarborough, N.M. (2005). Essentials of Entrepreneurship and Small Business

[57] Zucker, L. G., and Darby, M. R. (2007). Star Scientists, Innovation and Regional and National Immigration (No. w13547). National Bureau of Economic Research.

Received: 15 Feb 2019 | Revised: 14 Mar 2019 | Accepted: 30 Mar 2019