AIMC 2017
Asia International Multidisciplinary Conference

EXAMINING THE IMPACT OF ENTREPRENEURIAL ORIENTATION ON COMMERCIALIZATION THROUGH MARKET AWARENESS

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Abstract

This research concentrates on the significance of entrepreneurship orientation on commercialization exercises in higher education institutions (HEIs) of Pakistan. The essential unit of examination is the academic researchers who are engaged in allied sciences related research. In spite of the fact that, the extent of the exploration is restricted to research universities. Albeit, there is as yet a plausibility to determine some broad patterns and certainties which would add to the hypothesis and guide additionally research. Different statistical analyses were used to analyze the data e.g. Descriptive statistics and reliability, factor analysis (KMO and Bartlett's test, Eigen values and total variance) and then regression and correlation were used. SPSS 20 is used for different analyses. A theoretical framework was developed using three dimensions for Entrepreneurial orientation that is proactive, innovativeness and risk taking. The empirical results show that entrepreneurial orientation has significant impact on research commercialization, this relationship is also positively mediated by market awareness.

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Keywords: Entrepreneurial Orientation, Awareness and Commercialization.   .

1. Introduction

Research is progressively being perceived as having a key part in the territorial advancement process. Exchanging the consequences of university research to industry may take a few structures and in this manner, it can be accomplished in various ways. These incorporate productions, meetings, counseling, discussions and enlistment of graduates, co-administering, synergistic research, patents and licenses (Agrawal & Henderson, 2002). Some of these strategies include the exchange of information about new innovations to the economy (Gu & Whewell, 1999).

Research also make numerous commitment to financial and social areas however commercialization has a specific interest to approach creators in times of apparently quickening mechanical change, strikingly uneven territorial monetary execution and tight spending plans for advanced education. Because, researchers need to market their Research or just to register their patent comes about as any other option of their earning. This study will focus on the significance of entrepreneurial orientation on research commercialization with the mediation effect of awareness. Researchers belong to allied sciences are producing myriad of research in shape of research publications. In spite of the fact that there had been different investigations on knowledge and innovation exchange which are centered around employees, the examination had been done for the most part in developed nations (Zucker et al., 1998; Zucker and Darby, 2001).

2. Problem Statement

The emphasis of commercialization of university research is associated with research & development and commercialization and innovation (R&D&C&I) activities with the expansion of new knowledge based industrial acceptance. Universities are the backbone of the knowledge-based economy by contributing in economic growth (Audretsch et al., 2006; Audretsch et al., 2014). Participating in entrepreneurial activities and commercialization has changed the universities' traditional way of existence from just being a teaching and research institute into an entrepreneurial entity (Breznitz & Feldman, 2012). By keeping in mind, the importance of entrepreneurship, the researchers in Pakistani universities are with lack of entrepreneurial orientation and lack of market awareness which cause low commercialization. As per World Intellectual Property Organization (WIPO), Pakistan is far behind in innovativeness and commercialization activities (WIOP, 2017). Entrepreneurship is a way to cope up the issues faced in commercialization. Lack of market awareness is also one of main filter that impede knowledge commercialization (Govindaraju *et al.*, 2009). To cope up the commercialization issues in Pakistani universities, EO and market awareness has been gained substantial attention in this study.

3. Research Questions

The problem highlighted above raised following researcher questions:
- Does entrepreneurial orientation influence research commercialization?
- What is the impact of lack of market awareness on research commercialization?
- Does entrepreneurial orientation impact on lack of market awareness?

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▪ Does lack of market awareness mediate the relationship between entrepreneurial orientation and researcher commercialization?

4. Purpose of the Study

In mostly developed and developing countries, universities' mission is turning towards commercialization of knowledge created therein (Huyghe *et al.*, 2014). Beside teaching and research activities, universities are striving for becoming entrepreneurial entity. The purpose of this study is give directions to policy makers by identifying knowledge barriers (KBs) and possible solutions.

5. Review of Literature

In this new period of globalization, more savage 'worldwide subsidence' business people need to confront brutal rivalry, poorer benefit, and lesser market potential in their particular ventures (Ayub et al. 2013). Entrepreneurial firms or business people are high-daring individuals; consequently, create diverse items and administrations focused to new market fragments/specialties (Miller, 1983; Morris and Kuratko, 2002). EO is undertaken as "decision making practices, processes, and activities that leads to new venture or new entry in the market (Lumpkin and Dess, 1996). Miller (1983) portrayed EO of entrepreneurial firm as "one that participates in product innovativeness, attempts to risky ventures, first to think of "proactive", and "innovativeness. These three measurements have been embraced by most of pas studies to define EO (Lee, Lee & Yoo, 2000; Kreiser et al. 2002; Tarabishy et al. 2005).

Proactiveness is "the measurement of entrepreneurial introduction to be the business' nimbleness in reckoning of emotional changes and future needs and issues" (Lumpkin and Dess, 1996). Additionally, proactiveness is the propensity of a business to outflank equals in the commercial center by strongly and specifically difficult its rivals (Certo et al., 2009). The autonomous slant of a group or individual in delivering a dream and seeing it through finishing (Certo et al., 2009). Through Licensing, spin-off creations and patent knowledge transfer is possible between universities and industries, or exchange is also possible between Researchers and different Organization which also includes Government departments. (Henderson, Trajtenberg & Jaffe, 1998; Mowery, Sampat & Ziedonis, 2002).

5.1. Hypotheses

H₁: There is a statistically significant relationship exists between entrepreneurial orientation and research commercialization.

H₂: There is a positive and statistically significant relationship exists between entrepreneurial orientation and awareness.

H₃: There is a positive and statistically significant relationship exists between awareness and research commercialization.

H₄: Awareness mediates the relationship between entrepreneurial orientation and research commercialization.
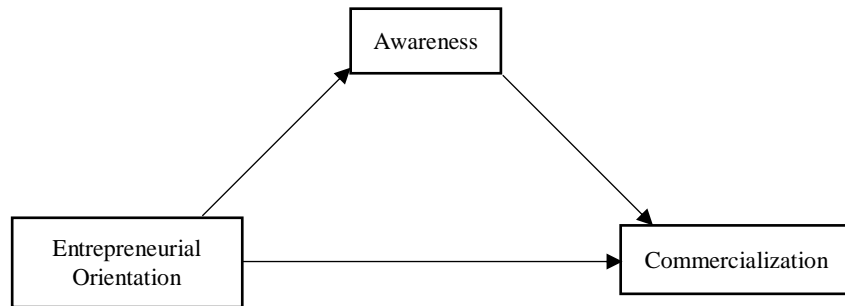
Figure 01. Theoretical Model

6. Research Methods

6.1. Sample/Population

Stratified random sampling was used in this study. As per the Higher Education Commission (HEC) (2017), there are following HEIs are recognized as universities/DAIs under general categories: The number of public sector universities in Lahore is 13 and number of private sector universities 20.

Public Sector Universities in Lahore:

- Government College University, Lahore
- King Edward Medical University
- Kinnaird College for Women
- Lahore College for Women University
- Information Technology University of the Punjab
- National College of Arts
- Pakistan Institute of Fashion & Design
- University of Education
- University of Engineering & Technology
- University of Health Sciences
- University of the Punjab
- University of Veterinary & Animal Sciences
- Virtual University of Pakistan

Private Sector Universities in Lahore:

- Ali Institute of Education
- Beaconheuse National University
- Forman Christian College
- Global Institute (Admission & Attestation stopped by HEC from 2016)
- Hajvery University
- Imperial College of Business Studies
- Institute of Management Sciences

- Lahore Garrison University
- Lahore Leads University
- Lahore School of Economics
- Lahore University of Management Sciences
- Minhaj University
- National College of Business Administration & Economics
- Nur intonational University
- Qarshi University
- The Superior College
- University of Central Punjab
- University of Lahore
- University of Management and Technology
- University of South Asia

6.2. Selection procedure

The researcher of current study developed 2 strata (private & public) and following universities being selected for data collection on random bases:

If N equal or less than 13 n will be 2 that is N13=n2 and if N is greater than 18 and equal to thirty the value of n will be 3 that is N23=n3

Public sector University Lahore 1, 11

1. Government college university Lahore
2. University of the Punjab

Private sector university Lahore   3,7,18

1. Forman Christian college
2. University of central Punjab
3. University of Lahore

6.3. Selection of respondents

Manning and Munro (2006) refer validity as "the propensity to which it measures what it actually is claiming to measure. To check the construct and discriminate validity, Principal component analysis (PCA) was applied using SPSS software version 20.0. PCA is most sophisticated method of factor analysis used for checking homogeneity (inter-item correlation) of the scale (Manning & Munro, 2006). If items of variable are measuring one concept, PCA extracts one component with greater eigenvalues more than 1.0, and it is also recommended that if component loadings are greater than 0.5, it provide better measurement (Hair et al., 2006). Further, it is also concurred that if competent loadings are greater than 0.04 it yields good measurement of underlying concept (Adnerson & Gerbing, 1988). And, if component loadings are lower than 0.04 or 0.5, all loadings should be deleted (Hair et al., 2006; Adnerson & Gerbing, 1988). More than one component loadings with greater eigenvalues than 1.0 should need to reduce further by performing scree plot (Hair et al., 2006; Manning & Munro, 2006). Stevens (1996) recommended more than 300 sample

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size for factor analysis through PCA, and Hair et al. (2011) suggested at least 10-20 times more than number of variables. They recommended that sample size must be at least five times greater than the items (observations of variables) are involved in the study.

6.4. Measurement of questions

The measurement is made through a Questionnaire. The questionnaire is adapted from previous studies. Entrepreneurial orientation was adapted from Miller (1983), which was further developed (Covin & Slevin, 1986; Naman & Slevin, 1993). Research Commercialization from Landry et al. (2007) and Awareness is adapted from Endsley, 1995. The reliability of the measurement is present in the tables below.

7. Findings

7.1. Descriptive Statistics

Table 01. Demographic Profile of Respondents

Respondent Demographics	Frequency	%
Gender (N = 405)		
• Male	218	53.8%
• Female	187	46.2%
Level of Education (N = 405)		85.2%
• MS	345	9.6%
• PhD	39	5.2%
• Post-Doc	21	
Age (N = 405)	49	12.1%
• 23-30	80	19.8%
• 31-40	199	49.1%
• 41-50	77	19.0%
• above 50		
Experience (N = 405)		11.1%
• one year	45	53.3%
• 1-5 years	216	27.7%
• 5-10 years	112	7.9%
• Above 10 years	32	
Designation (N = 405)		43%
• Lecture	174	25.7%
• Assistant professor	104	23.5%
• Associate professor	95	7.9%
• Professor	32	
Name of University (N = 405)		
• Forman Christian College	66	16.3%
• University of Central Punjab	86	21.2%
• University of Lahore	80	19.8%
• Government College University, Lahore	89	22%
• University of the Punjab	84	20.7%
Discipline (N = 405)		
• **Allied sciences**	405	100%

According to above table out of 405 populations, 218(53.8%) is male and 187(46.2%) were female. Out of 405 respondents most of the respondents are MS qualified that is 345(85.2%) and 39(9.6%) population were PhD qualified where as 21(5.2%) population have of Post-Doc.

49(12.1%) respondents have the age between 23-30 years, 80(19.8%) respondents have age between 31-40 years, 199(49.1%) respondents have age between 41-50 years and 77(19%) respondents have age more than 50 years, so majority of the respondents have age between 31-40. Out of 405 respondents 45(11.1%) population have experience of 1 year, 216(53.3%) respondents have experience between 1-5 years, 112(27.7%) respondents have experience between 5-10 years and 32(7.9%) respondents have experience of more than 10 years. Out of 405 most of the respondents has designation of lecturer that is 174(43%), 104(25.7%) of respondents have the designation of Assistant Professor, 95(23.5%) respondents have designation of Associate Professor and 32(7.9%) respondents has designation of Professor. According to above table out of 405 almost 66(16.3%) respondents belongs Forman Christian College, 86(21.2%) belongs to University of Central Punjab, 80(19.8%) belong to University of Lahore, 89(22%) were belong to Government College University Lahore while 84(20.7%) belongs to the university of the Punjab. In this study all of the 100% respondents belong to the Allied Sciences.

Table 02. Descriptive Statistics of Questioner Items

Items	N	Minimum	Maximum	Mean	Std. Deviation
Entrepreneurial Orientation					
EO 1	394	1	5	3.44	.992
EO 2	400	1	5	3.25	.995
EO 3	402	1	5	3.58	.487
EO 4	395	1	5	3.44	.589
EO 5	405	1	5	3.46	.982
Awareness					
AR 1	401	1	5	3.45	.885
AR 2	400	1	5	3.45	.887
AR 3	395	1	5	3.25	.896
AR 4	398	1	5	3.42	.874
Research Commercialization					
RC 1	402	1	5	3.47	.985
RC 2	400	1	5	3.23	.952
RC 3	398	1	5	3.28	.931
RC 4	397	1	5	3.25	.956

This study is based on 13 items. Responses of all the items were recorded on a five point likert scale which varies from one to five. Mean scores of the things ranges from 3.25 to 3.47 and the estimation of standard deviation run from 0.487 to 0.995.

Table 03. Reliability of Measurement

Constructs	Valid N	Number of Items	Cronbach's alpha
Entrepreneurial Orientation	384	5	.954
Awareness	399	4	.912
Research Commercialization	402	4	.965
Over all reliability (take all questions)	402	13	.975

The reliability of each item of data instrument is shown in the above table. The values vary from .912 to .965 Entrepreneurial orientations with 95.4%, Awareness with 91.2% and Research Commercialization with 96.5%. High values represent that there is a consistency between constructs items the overall reliability of the construct is 97.5%.

Table 04. KMO and Bartlett's Test

Constructs	No of items	KMO Measure of Sample adequacy	Bartlett's Test of Sphericity Chi-Square	Bartlett's Test of Sphericity Significance
Entrepreneurial Orientation	5	.875	1.54	.000
Awareness	4	.826	1.21	.000
Research Commercialization	4	.846	1.13	.000

The value of KMO considered smart if it is equal or greater than 0.7 (Hutcheson & Sofroniou, 1999). The above table demonstrates that all the values are greater than 0.06 which are acceptable. And values of the construct present, those items have the enough information to present data.

Table 05. Eigen Values and Total Variance Explained

Constructs	Components	Initial Eigen values		
		Total	% of variance explained	Cumulative % of variance explained
Entrepreneurial Orientation	COMP 1	3.589	75.256	75.256
Trust	COMP 1	3.589	80.258	80.258
Research Commercialization	COMP 1	3.256	76.352	76.352

For further Analysis the component of construct having value greater than `1 can be considered. The above table shows all the Eigen values and variances explained for the above constructs. The above table shows that only one component extracted from the each construct using PCA. In the above table Entrepreneurial orientation clarifying 75.25% variance, Trust clarifying 8.25% variance and Research Commercialization is clarifying 81% fluctuation.

Table 06. Factor Loadings

Items		Loadings
Entrepreneurial Orientation		
EO 1	I always try to make some changes in my business	.812
EO 2	I preferred high risk projects with a high return	.854.
EO 3	At the point when our competitors build up another item or another business technique, our business rapidly reacts to it and adopt it	.912
EO 4	At the point when our competitors build up another item or another business technique, our business rapidly reacts to it and adopt it	.875
EO 5	People are encouraged to think and behave differently	.862
Awareness		
AR 1	The investment should be made in a wide range of new technological advancement	.912
AR 2	The investment on a R&D program should be made in the partnership with our competitors so our development cost can be reduced	.934
AR 3	In the manufacturing concern to improve the efficiency we must limit the brand features.	.845
AR 4	For a new product, we must penetrate in a potential market despite of heavy competition.	.956
Research Commercialization		
RC 1	Do you publish your research or convey it to others through conference or other means	.924
RC 2	Do you convey/share your research result with the parties that may have prime concern with those results	.945
RC 3	To what extent this research benefits you in monetary terms	.954
RC 4	Based on your research result do you have patent of your invention	.923

The minimum value for loading off all items should always be greater than 0.40 and the cross stacking of the things ought not be over 0.40. For every one of the develops (Entrepreneurial orientation, Research Commercialization and Awareness) all related thing are loaded on only one segment with changed component loadings going from 0.812 to 0.912, 0.923 to 0.945 and 0.845 to 0.956 separately as appeared in table.

Table 07. Correlation Matrix for Entrepreneurial Orientation

	1	2	3	4	5
EO 1	1	.625**	.875**	.965**	.458**
EO 2		1	.789**	.698**	.478**
EO 3			1	.478**	.985**
EO 4				1	.763**
EO 5					1

Table 08. Correlation Matrix for Awareness

	1	2	3	4
AR 1	1	.258**	.458**	.458**
AR 2		1	.589**	.789**
AR 3			1	.369**
AR 4				1

Table 09. Correlation Matrix for Research Commercialization

	1	2	3	4
RC 1	1	.489**	.896**	.698**
RC 2		1	.985**	.789**
RC 3			1	.478**
RC 4				1

The correlation analysis has been utilized to confirm shared relationship among the item of each develop. As indicated by result the estimations of relationship coefficients for each construct is connected with each other.

Table 10. Mediation test

Independent variable	Dependent variables
	Research Commercialization
Entrepreneurial Orientation	.884**
	(36.728)
Adjusted R^2	.783
F-Statistics	1.349
Independent variable	Dependent variable
Entrepreneurial Orientation	**Research Commercialization**
Entrepreneurial Orientation	.644**
	(11.172)
Awareness	.333**
	(21.419)
Adjusted R^2	.778
F-Statistics	648.613

Table 11. Sobel test

Independent variable	Mediating	Dependent	Sobel test value	P-value
Entrepreneurial Orientation	Awareness	**Research Commercialization**	18.50	.000

Table 12. Aroian test

Independent variable	Mediating	Dependent	Aroian test value	P-value
Entrepreneurial Orientation	Awareness	**Research Commercialization**	18.49	0.000

Table 13. Goodman test

Independent variable	Mediating	Dependent	Aroian test value	P-value
Entrepreneurial Orientation	Awareness	**Research Commercialization**	18.50	0.000

Mediation test can be applied if independent variable has significant impact on dependent variable, mediating variable has significant variable on dependent variable and independent variable has significant impact on mediating variable (Baron & Kenny, 1986; Judd & Kenny, 1981; James & Brett, 1984). In the event that coefficients of both factors that are (mediating and independent) are significant then it demonstrates the partial mediation of mediating variable among dependent and independent variable.

The analysis explains that entrepreneurial orientation is scientifically correlated with market awareness (which is also known as knowledge barrier) and EO also has strong relationship with researcher commercialization. The coefficients of mediating analysis also describe that lack of market awareness among academic researchers has strong impact on researcher commercialization and mediates the relationship of entrepreneurial orientation and researcher commercialization in Pakistani universities. The results of current study also support by previous studies where it is clearly recognized that academics EO has impact on research commercialization and market awareness in one of main factor which can be considered to uplift the commercialization activities to attract the industry for collaboration (Khademi *et al.*, 2015; Kamal *et al.*, 2016; Shariffuddin *et al.*, 2017).

8. Conclusion

This study revealed its findings in the tables above that there is statistically and significant relationship between Entrepreneurial orientation and Research Commercialization. And awareness mediates the relationship between Entrepreneurial orientation and Research Commercialization. The hypothesis of the study $H1_1$ is accepted that there is a strong and statistically significant relationship between Entrepreneurial orientation and research Commercialization. $H1_2$: There is a positive and statistically significant relationship exists between Entrepreneurship orientation and awareness is accepted $H1_3$: There is a positive and statistically significant relationship exists between Trust and research commercialization is accepted and $H1_4$: Awareness mediates the relationship between Entrepreneurship orientation and research commercialization. The results revealed that Entrepreneurial orientation has significant effect on the commercialization of research.

8.1. Limitations and Directions for further research

This study is simply coordinated on the researchers belongs to universities of a city Lahore other universities in country as well as world is ignored. This study is based on significance of Entrepreneurial orientation on research commercialization where other variables may have significant effect on research commercialization. It means in future it can be measure with different other variables and researchers with other variables may present other views of study. The behavior of researchers may vary as research is conducted only in one city of Pakistan.

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