

Measuring and Validating the Scale of Entrepreneurial Orientation: A Confirmatory Factor Analysis Approach

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Abstract

The prime goal of the study is to understand the concept of entrepreneurial orientation (EO) of the technical institutions in Odisha. Further, this study tries to measure and validate the scale of EO developed by Miller, Covin, & Slevin (1989). Data from 397 respondents, who are basically the employees of the technical institutions, are collected to test the convergent and discriminant validity of the scale. In order to develop a measurement model, an exploratory factor analysis, followed by a confirmatory factor analysis, is deployed. The scale is found to have strong construct validity and the measurement model of the three underlying constructs – innovativeness, proactiveness and risk-taking developed by Miller, Covin, & Slevin (1989) – shows a good model fit.

Keywords: Entrepreneurial Orientation, Exploratory and Confirmatory Factor Analyses, Scale Validation

Introduction

The history of research on entrepreneurial orientation (EO) dates back to the year of 1960. The first study on this concept was done by Aston group. But the findings were not very clear. So, the first and the actual study related to EO was done by Miller in 1983 and it was about the entrepreneurial activities of the firm. It first defined an entrepreneurial organization as one that has proactiveness, innovativeness and risk-taking nature. EO is the extent proactiveness and innovativeness (Merz & Sauber, 1995; Covin & Wales, 2011). EO is a concept that covers important decisions made by the whole

organization (Dess & Lumpkin, 2001; Covin & Wales, 2012). Entrepreneurial firms must have managers with entrepreneurial styles and innovative strategies (Miller & Friesen, 1982, p. 1; Covin & Wales, 2011). Later studies also show a positive relation of EO with firm's performance (Pugh, Hickson, Hinings, McDonald, Turner, & Lupton, 1963, p. 291; Covin & Wales, 2012).

Therefore, it is always highly necessary to check the EO of any firm. Miller, Covin and Slevin come up with a scale to measure EO in corporate, Miller, Covin, & Slevin scale (1983). The literature review reveals that there have been several studies to measure EO in corporate but there is no study to measure the EO in educational or technical institutions.

Therefore, this study tries to measure EO in technical institutions of Odisha with the help of Miller, Covin, & Slevin scale (1983).

This study will try to strengthen the literature on EO and the applicability of the Miller, Covin, & Slevin scale (1983), as it examines the applicability of the scale in technical institutions.

Literature Review

EO is 'a managerial temperament to search for new possibilities through which remarkable growth can be achieved' (Covin & Wales, 2012; Mintzberg, 1973). It is 'an entrepreneurial management panache linked to risky and aggressive decision making (Covin & Wales, 2012; Khandwalla, 1976/1977). The early studies of Mintzberg & Khandwalla proposed EO as a managerial temperament to take decision and this is considered a foundation for the

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rest of the studies. Many studies have revealed the holistic nature of EO and concluded that it is an enterprise-level phenomenon (Covin & Slevin, 1989; Covin & Wales, 2012; Lumpkin & Dess, 1996; Miller & Friesen, 1982).

The study done by Miller and Friesen (1982) has first linked EO with a set of organizational behavior like innovativeness, proactiveness and risk-taking. Miller (1983) proposed innovativeness, proactiveness and risk-taking as the scales to measure EO (Slevin & Tarjesen, 2011). Miller opines that these three dimensions should co-vary to manifest EO or EO is a shared variance of these dimensions.

The study done by Lumpkin and Dess (1996) defines EO as the practices, processes and activities that lead to a new entry. New entry means either a new business or new products or services in the existing business. Autonomy and competitive aggressiveness can be the measures of EO, but later studies have confirmed that competitive aggressiveness is a part of proactiveness dimension, and autonomy is a part of organizational climate (Hough & Scheepers, 2008; Chang & Lin, 2011). Therefore, Miller, Covin, & Slevin scale (1983) is the unquestioned and mostly accepted scale for EO measurement.

The study done by Taatila and Down (2012) has measured EO in the students of Laurea university, Finland and concluded that the entrepreneurial desires among the academic programs may differ but the results of EO do not.

Covin and Wales (2012) explored the concept of EO, the challenges and decision criteria's of formative, and reflective measurement approaches and concluded that EO as a 'latent construct exists apart from its measures and the researchers are free to choose which ever approach or measurement scale (one-dimensional or multidimensional) that fits their research purpose'.

Kusa (2016) measured EO in social context and concluded that EO can be measured with the help of existing scales but there should be a modification on competitive aggressiveness and autonomy dimension.

Therefore, this study chooses the Miller, Covin, & Slevin (1989) scale for measuring EO as it is widely accepted and unquestioned compared to other scales.

Research Methodology

This is an explorative and descriptive study. The study has done exploratory factor analysis (EFA) to identify the most suitable variables under each construct; hence, it is exploratory in nature. The study is based on primary data and describes the model to measure EO; hence, it is descriptive in nature. It checks the applicability of Miller, Covin, & Slevin scale to measure EO in educational institutions and checks the validity of the same with the help of a measurement model by confirmatory factor analysis (CFA). A questionnaire is prepared as per the scale undertaken and an online survey is conducted among the employees of technical institutions of Odisha. The questionnaire was sent to the personal mails of around 500 employees and replies so obtained from 397 employees were considered for the analysis. Since the responses so obtained are considered for the analysis, the study includes a convenience sampling.

Respondent's Profile

Table 1: Respondent's profile

Demographics	Particulars	No.	%
Gender	Male	232	58
	Female	165	42
Age	<20 Yrs	58	15
	20-35 Yrs	166	42
	35-50 Yrs	97	24
	>50 Yrs	76	19
Experience	<1yr	69	17
	1-3 years	121	31
	3-5 Yrs	89	22
	>5 Yrs	118	30
Level of Job	Higher	66	17
	Middle	223	56
	Lower	108	27

Measure

The measure of the study is the Miller, Covin, & Slevin scale (1989). It measures EO construct along with underlying dimensions, i.e., innovativeness, proactiveness and risk-taking. The responses were obtained by a 1–5 Likert scale where 3 is neutral.

Table 2: Construct Reliability and Validity

	<i>CR</i>	<i>AVE</i>	<i>MSV</i>	<i>Innovativeness</i>	<i>Proactiveness</i>	<i>Risk taking</i>
Innovativeness	0.920	0.920	0.454	0.960		
Proactiveness	0.930	0.820	0.142			
Risk taking	0.950	0.810	0.004		-0.020	

Composite reliability (CR) is a better measure of reliability as compared to Cronbach's alpha (Chin, 1998). Hence, the reliability of the EO construct is measured by CR. Constructs are reliable if CR is more than 0.7 (Hair et al., 1996). It can be seen from Table 2 that all constructs have CR more than 0.7; so, the scale is reliable.

The validity of the scale can be measured with the help of convergent and discriminant validity (Hair et al., 2010). Convergent validity can be established with the help of CR and average variance extracted (AVE) if the values of CR and AVE are more than 0.7 (Hair et al., 2010) and it is evident from the table as the values of CR and AVE are more than 0.7; hence, it establishes convergent validity. Discriminant validity can be established with the

help of AVE and maximum shared variance (MSV), if AVEs are more than MSVs. It can also be proved beyond doubt from Table 2 that the scale holds good discriminant validity as all AVEs are more than MSVs. Therefore, the scale is reliable as well as valid.

Exploratory Factor Analysis (EFA)

The Miller, Covin, & Slevin scale (1989) has three underlying constructs such as innovativeness, proactiveness and risk-taking. An EFA is conducted to check whether the data reflects the three underlying constructs. EFA is conducted with the help of SPSS.20.

Table 3: Total Variance Explained

<i>Factor</i>	<i>Initial Eigenvalues</i>			<i>Extraction Sums of Squared Loadings</i>			<i>Rotation Sums of Squared Loadings</i>		
	<i>Total</i>	<i>% of Variance</i>	<i>Cumulative %</i>	<i>Total</i>	<i>% of Variance</i>	<i>Cumulative %</i>	<i>Total</i>	<i>% of Variance</i>	<i>Cumulative %</i>
1	3.438	38.196	38.196	2.454	27.269	27.269	2.315	25.720	25.720
2	2.432	27.022	65.218	2.903	32.255	59.524	2.234	24.825	50.545
3	1.585	17.615	82.833	1.373	15.259	74.782	2.181	24.238	74.782
4	.432	4.805	87.638						
5	.273	3.032	90.670						
6	.269	2.986	93.655						
7	.243	2.696	96.351						
8	.179	1.988	98.339						
9	.150	1.661	100.000						

Extraction Method: Maximum Likelihood.

Table 4: Rotated Factor Matrix

	<i>Factor</i>		
	<i>1</i>	<i>2</i>	<i>3</i>
Emphasis on R&D, Technological leadership and Innovation	.904		
Marketing new lines of product and services	.827		
Modification of product and service line	.846		
Initiating actions		.832	
Introduction of new technology, product and techniques		.864	

	Factor		
	1	2	3
Adoption of competitive posture		.831	
Productivity for high risk projects			.702
Response to thenature of environment			.879
Acts to explore potential opportunities			.954
Extraction Method: Maximum Likelihood.			
Rotation Method: Varimax with Kaiser Normalization.			
Rotation converged in four iterations.			

From the total variance extracted (Table 3), we can notice that there are only three factors having eigenvalues more than one. Therefore, there are only three factors in the model. And, Table 3 of rotated factor matrix (Table 4) also confirms the existence of only three factors.

the data fit the hypothesized model. CFA is done with the help of AMOS.20. AMOS gives different indices to check the model fit and this study has taken indices such as CMIN/DF, RMSEA, GFI, AGFI, NFI, CFI, and SRMR for checking the model fit (Gerpott et al., 2001; Homburg & Baumgartner, 1995; Hair et al., 2010).

Confirmatory Factor Analysis (CFA)

CFA explains the extent to which observed variables represent the latent constructs or put in a different way

Measurement Model

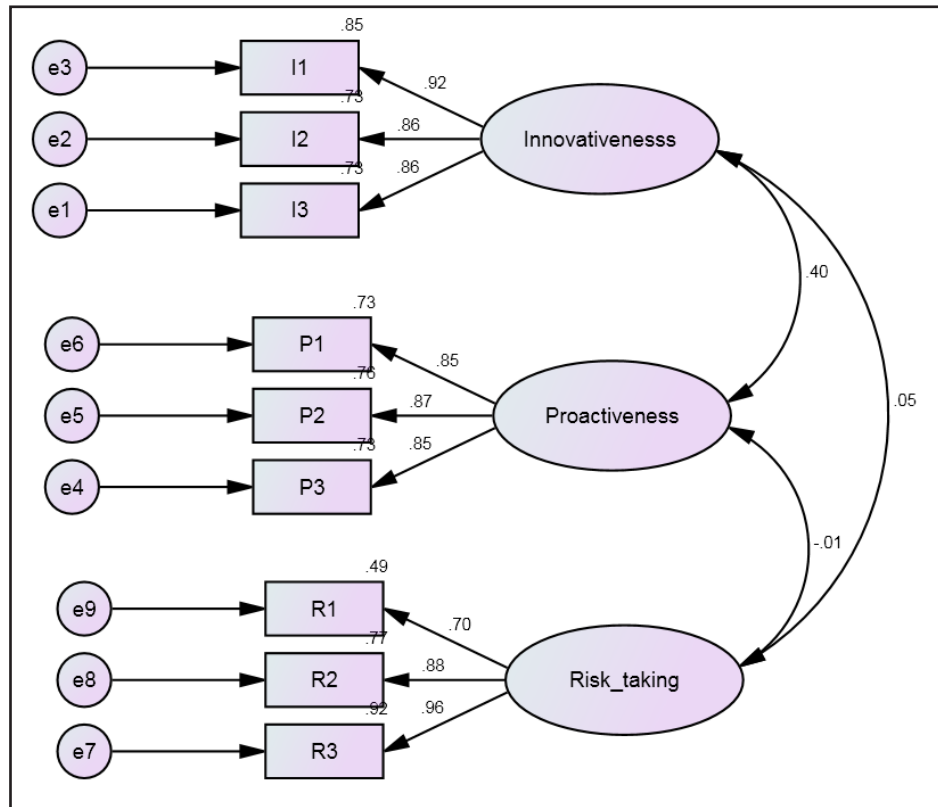


Fig. 1: Measurement Model

Table 5: Model Fit Indices

Indices	Obtained values	Threshold values	Reference
P-Value	0.044	>0.05	Gerpott et al., (2001); Homburg & Baumgartner, (1995); Hair et al., (2006)
CMIN/DF	1.540	0> CMIN/DF<5	
RMSEA	0.037	<0.08	
GFI	0.98	>0.9	
AGFI	0.963	>0.9	
NFI	0.984	>0.9	
CFI	0.994	>0.9	

To accept a model as model fit, the value of CMIN/DF should be less than 2.5 (Gerpott et al., 2001); the values of GFI, AGFI, NFI, and CFI should all be more than 0.95; and the value of RMSEA should be less than 0.08 (Hair et al., 2006). It can be noticed that the values of all fit indices are as per the requirement, except the *p*-value that should be more than 0.05, and the actual value is just close to it and is acceptable at this sample size (Table 5). Hence, the measurement model shows a strong model fit.

Conclusions

The study reveals that the Miller, Covin, & Slevin scale with the three underlying constructs – innovativeness, proactiveness and risk-taking – shows a good model fit. Therefore, the scale is applicable in technical educational institutions to measure entrepreneurial orientation. Further, the study also reveals that the Miller, Covin, & Slevin scale, which was originally a 7-point Likert scale, can also be used in a 5-point, i.e., 1-5 Likert scale by taking 3 as neutral point.

Findings of the study are consistent with the studies of Taatila and Down (2012) and Kusa (2016). The findings of the study measure EO with the help of three underlying dimensions, i.e., innovativeness, proactiveness and risk-taking, in the context of technical institutions of higher education.

The results of the study indicate that the scale undertaken has a strong reliability, validity and a good model fit. Therefore, the scale can be used to measure EO in technical educational institutions.

References

- Chang, H. J., & Lin, S. J. (2011). Entrepreneurial intensity in catering Industry: A case study onwang group in Taiwan. *Business and Management Review*, 1(9), 1-12
- Chin W. W. (1998). The partial least squares approach for structural equation modeling. In GA Marcoulides (ed.), *Modern Methods for Business Research*, pp. 295-336. Lawrence Erlbaum Associates, London
- Covin J. G., & Wales W. (2011). The measurement of entrepreneurial orientation. *Entrepreneurship: Theory and Practice*, 36(4), 677-702. Retrieved from <http://dx.doi.org/10.1111/j.1540-6520.2010.00432.x>
- Covin, J. G., & Slevin, D. P. (1989). Strategic management of small firms in hostile and benign environments. *Strategic Management Journal*, 10(1), 75-87
- Gerpott, T. J., Rams, W., & Schindler, A. (2001). Customer retention, loyalty and satisfaction in the german cellular telecommunications market. *Telecommunications Policy*, 25(4), 249e269
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis* (7th ed.). Englewood Cliffs, NJ: Prentice-Hall
- Homburg, C., & Baumgartner, H. (1995). Beurteilung von Kausalmodellen. *Marketing*, 17(3), 162-176
- Hough, J., & Scheepers, R. (2008). Creating corporate entrepreneurship through strategic leadership. *Journal of Global Strategic & Management*, 3, 17-25
- Khandwalla, P. N. (1976/1977). Some top management styles, their context and performance. *Organization & Administrative Sciences*, 7, 21-51
- Kusa, R. (2016). Measuring entrepreneurial orientation in the social context. *Entrepreneurial Business and*

Business Review, 4(3), 117-129. DOI: [http:// dx.doi.org/10.15678/EBER.2016.040309](http://dx.doi.org/10.15678/EBER.2016.040309)

Lumpkin, G. T., & Dess, G. G. (1996). Clarifying the entrepreneurial orientation construct and linking it to performance. *Academy of Management Review*, 21, 135-172

Merz, G. R., & Sauber, M. H. (1995). Profiles of managerial activities in small firms. *Strategic Management Journal*, 16, 551–564

Mintzberg, H. (1973). Strategy-making in three modes. *California Management Review*, 16(2), 44–53.

Miller, D., & Friesen, P. H. (1982). Innovation in conservative and entrepreneurial firms: Two models of strategic momentum. *Strategic Management Journal*, 3, 1-25

Mintzberg, H. (1973). Strategy-making in three modes. *California Management Review*, 16(2), 44–53

Pugh, D. S., Hickson, D. J., Hinings, C. R., MacDonald, K. M., Turner, C., & Lupton, T. (1963). A conceptual scheme for organizational analysis. *Administrative Science Quarterly*, 8(3), 291-315

Slevin, D. P., & Tarjesen, S. A. (2011). Entrepreneurial orientation: Reviewing three papers and implications for further theoretical and methodological development. *Entrepreneurship Theory and Practice*, s(5), 973-987. Retrieved from <https://doi.org/10.1111/j.1540-6520.2011.00483.x>

Taatila, V., & Down, S. (2012). Measuring entrepreneurial orientation of university students. *Education training*, 54(8/9), 744-760. Retrieved from <https://doi.org/10.1108/00400911211274864>

Appendix

Model Fit Summary

CMIN

Model	NP	CMIN	DF	P	CMIN/DF
Default model	21	36.961	24	.044	1.540
Saturated model	45	.000	0		
Independence model	9	2338.203	36	.000	64.950

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.047	.980	.963	.523
Saturated model	.000	1.000		
Independence model	.626	.435	.294	.348

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.984	.976	.994	.992	.994
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.667	.656	.663
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.037	.006	.059	.814
Independence model	.402	.388	.416	.000