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EFA and CFA of bureaucratic culture, Links, and entrepreneurial Satisfaction for multi-dimensional scale of entrepreneurial ecosystem

Amanullah Parhyar*
Lecturer, Department of Business Administration, Government College University Hyderabad, Sindh, Pakistan,

Waqar Ahmed Sethar
Lecturer, Institute of science, Technology & Development, Mehran University of Engineering and Technology, Jamshoro, Sindh, Pakistan

Dodo Khan Alias Khalid Malokani
Assistant Professor, Department of Business Administration, Government College University Hyderabad, Sindh, Pakistan

Dr. Raza Ali Tunio
Lecturer, Department of Business Administration, Government College University Hyderabad, Sindh, Pakistan

Dr. Shoaib Khan Pathan
Director ORIC, Government College University Hyderabad, Sindh, Pakistan

**Corresponding Author: amanullah.Parhyar@gcuh.edu.pk, parhyaramanullah786@gmail.com*

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Abstract: The aim of this study was to use exploratory and confirmatory factory (CFA) to investigate the factor structure of bureaucratic culture, linkages, and entrepreneurial satisfaction scale for multi-dimensional scale of entrepreneurial ecosystem scale.
Methods: A total of 400 founders and co-founders of startups and firms recruited using snowballing sampling to complete the survey Exploratory factor analysis (EFA) in and CFA was performed on the 228 individuals who completed and agreed to participate in the study.
Results: Exploratory factor analysis showed that questions on bureaucratic culture revealed two factors, EFA on linkages revealed 3 factors and EFA on entrepreneurial satisfaction revealed two factors and , factors with two items are excluded from the further analysis and CFA performed on remaining one-factors solution for each construct, CFA results show that acceptable values of Cronbach Alpha(0.60-0.85), composite reliability(>0.80) and average variance extracted (>0.50) show satisfactory results on terms of construct reliability, discriminant validity(>0.708) and outer

loadings (.0.708), one item having outer loading <0.40 is removed. Goodness-of-fit statistics with SRMR is 0.081 and it shows poor fit.

Conclusion: Overall 4 items on links and 2 items from entrepreneurial satisfaction are excluded, while constructs with 4 items (Bureaucratic Culture) and (Bureaucratic Cost) with 3 items are included for the final analyses and can be used with multi-dimensional scale of entrepreneurial ecosystem , however, further research is needed with larger sample and diversified sample to understand the factor structure of all three constructs and regression analysis can be done by designating entrepreneurial satisfaction as dependent variable.

Key words: EFA, Bureaucratic Culture, Bureaucratic Cost, Links, Entrepreneurial Satisfaction, Ecosystem

Introduction

The entrepreneurial ecosystem concept has gained scholarly attention over the past six years, ecosystem system concept focuses on enabling environment and how it shapes the entrepreneurship and the entrepreneurial behavior, this concept is theoretically is in nascent stage and much of scientific literature on it is non-scientific (Malecki, 2018;Stam, 2015); and there is exit little analytical framework (Simatupag et al., 2015 and Roundy et al., 2018). This concept helps in systematic understanding of the environment underpinning entrepreneurship and entrepreneurship behavior much of the attention is given to identification of components of entrepreneurial ecosystem (Spigel, 2016; Roundy et al., 2018).The entrepreneurial ecosystem approach is treated as a complex adaptive system and its components can interact with each other in unpredictable ways (Levin, 2002; Holland, 2006). In this research we are exploring the factor structure of items on satisfaction of entrepreneurs; since their satisfaction is important for SMEs (Cooper &Artz, 1995) ;it is important for every stages of entrepreneurship such as when to enter in entrepreneurship and when to leave entrepreneurship and the time spent during entrepreneurship tenure((Lauto et al., 2019); moreover, it also explains the attitude of entrepreneurs and their decisions such as risk propensity, willingness to make investment, intention to continue with the venture and commitment to change (Block, Sandner, & Spiegel, 2009; Thurik, &Aguado, 2013; Bradley & Roberts, 2004), understanding entrepreneurs satisfaction will help us understand how they are behaving under any entrepreneurial ecosystem of any region. The link between bureaucracy and entrepreneurship has attracted less scholarly attention; traditionally bureaucracy is characterized by division of labor, common roles, adoption of standard common procedures (Cahnman et al., 1969) and on the other hand entrepreneurship is more concerned with exploiting new business opportunities and it may introduces disruptive innovation in a (Schumpeter 1934; Kirzner 1973; Venkatraman 1997; Shane,2003), so it is claimed that rigid bureaucratic activities may suppress entrepreneurship, this is therefore, important to explore it through empirical tools and procedures to shed light on the interaction of bureaucratic activities and entrepreneurship in the context of Pakistan.

Linkages of entrepreneurs within an ecosystem are important and the sustained growth depends on the effectiveness of diverse and interconnected actors such as private sector, society, academia, entrepreneurs and others who are the makers of an ecosystem; the idea of interconnectedness is that firms to achieve competitive advantage have to base their business models on knowledge spillovers , local endowments, government support, network externalities and share resources (Bouncken & Kraus, 2021); furthermore,

the linkages established within an ecosystem among multitudes of stakeholders effects the evolution, configuration and outcomes of entrepreneurial ecosystem (Fernandes & Ferreira, 2021). According to network theory every complex system is network laden and the diverse set of actors achieve the goal of forming a path where every actor is connected indirectly ; this network of linkages produces a certain structure and position for the actors and relate this networking with achievements and outputs achieved by these diverse nodes or actors (Purbasari, 2019; Ullah 2020). The previous research by Ligouri E. et al. (2019) has developed the multidimensional structure of entrepreneurial ecosystem which has not studied or developed the factor structure of entrepreneurial satisfaction; linkages and bureaucratic culture within an entrepreneurial ecosystem. The aim of this research is to investigate the factor structure of bureaucratic culture, linkages, and entrepreneurial ecosystem.

Materials and Methods Participants

The authors have visited incubation centers and interacted with founders and co-founders of startups and based on interaction with entrepreneurs the items for the scales have been generated which are given in the table ;the survey was conducted again by adopting the questionnaire as developed by Waqar et al., (2021) using items for the constructs used in this research and adopting snowball sampling technique the survey questionnaire was administered to 225 founders and co-founders of firms and startups who agreed to participate in the study.

Statistical Analysis

Statistical analysis was done using descriptive statistics and exploratory factor Analysis (EFA) to understand the factor structure of measure, the Kaiser Meyer Olkin Measure of Sampling adequacy and Bartlett's Test of Sphericity was performed to see the suitability of data for factor analysis (Dziuban & Shirkey, 1974; Khan, Ullah, Usman, Malik, Khan, (2020)). The exploratory factor analysis was performed to with varimax rotated solution and used principal component analysis to test the theoretical structure of the constructs. The confirmatory factor analysis was performed in Smart PLS using PLS-SEM method to measure construct validity measures i.e. Cronbach Alpha, composite reliability, average variance extracted and discriminant validity as well item reliability i.e. outer loadings. Finally, goodness of fit method using Comparative Fit Index (Bentler, 1990), and standardized root mean square residual or SRMR (Hooper et al., 2008).

Results

Demographic information about the participants can be seen in Table 1. Data on highest attained educational level was collected, and showed that the majority of the sample had attended at least 3 years of higher education.

The majority of the respondents are in the age group of 26-35 years (55%), males (95%), females (6%), 33% of the respondents are from rural areas and 66% from urban areas, majority of the respondents having business experience are in (0-10 Years), 74% respondents having education bachelor and masters and M.Phil.

Table 1 **Demographic Profile**

	Frequency (%age)
Education	
Matriculation	10(4.5%)
Intermediate	43(19.4%)
Bachelor	114(51.4%)
Masters/Mphil	53(23.9%)
PhD	2(0.9%)
Age	
20-25 Years	23(10.4%)
26-35 Years	123(55.4%)
36-46	50(2.3%)
>47 Years	26(11.7%)
Gender	
Male	212(95.5%)
Female	10(4.5%)
Background	
Rural	74(33.3%)
Urban	148(66.7%)
	Total n= 222

The inter item correlation of all items ranged between -0.249 and 0.866. The scales entrepreneurial satisfaction, bureaucratic culture , bureaucratic cost and linkages showed low correlation with each other (0.038–0.083). The Cronbach alpha is relatively high and shows good reliability for all scales and in the range of (0.660-0.851) see Table 4.

The items were checked for skewness and kurtosis and these are shown in Table 2, together with the wording of the items, their respective subscales, mean scores and standard deviations. Based on the Kolmogorov-Smirnov and Shapiro-Wilks test showed that the items have non-normal distribution p-value was <0.05. The histograms and q-q plot showed that items had a skewness range between -1.039and 0.229 (SE = 0.0709) and a kurtosis range between 1.072 and -1.078 (SE = 0.0597) (Table 2). The Murdia kurtosis and Murdia skewness test was performed and the *p* value for all items was <0.0001 thus indicating non-normality, we also checked the Doornik Hansen test for normality and found that *p*-value <0.0001 and the data shows non normal distribution.

Table 2 Descriptive Statistics

	Mean	SD	Skewness	Kurtosis
ES1. Your present business / startup gives you satisfaction than jobs in other organizations	3.48	1.307	-0.509	-0.969
ES2. The chance your business/startup gives you to do what you are best	4.03	0.889	-0.997	1.072
ES3. Your present business/startup when you consider the expectations you had when you took the business/startup	3.27	1.154	-0.339	-0.738
ES4. You are satisfied with present business/startup in light of your career expectations	3.60	0.870	-0.385	-0.122
ES5. Most days You are enthusiastic about your work in Business/startup	3.58	0.927	-0.377	-0.125
ES6. I like my business/startup better than the average worker does	3.60	0.982	-0.395	-0.158
ES7. I find real enjoyment in my business/startup	3.70	0.936	-0.448	0.057
Brc1. Government rules and procedures are beneficial for entrepreneurs / businessmen	3.14	0.992	-0.406	-0.481
Brc2. Bureaucrats are very cooperative towards entrepreneurs / business	3.09	0.947	-0.117	-0.231
Brc3. I have ease of access of information from government departments	2.84	0.983	0.119	-0.058
Brc4. There is corruption and practice of bribery in government departments	3.19	1.234	0.004	-0.870
Brc5. It takes lot of time in documentation , rules and procedures in government departments	2.83	1.114	0.136	-0.427
Brc6. It gets costly when we go for registration of company and other procedures	2.78	1.012	0.164	-0.169
Brc7. Behavior of staff in government department is always good towards businessmen / entrepreneurs	2.77	1.057	0.229	-0.282
Link1. Linkages with customers	3.87	1.075	-1.039	0.645
Link2. Linkages with suppliers	3.80	1.100	-0.980	0.463
Link3. Linkages with Universities and Academics	3.41	1.149	-0.455	-0.382
Link4. Linkages with Industry experts, Technical Persons	3.42	1.047	-0.344	-0.282
Link5. Linkages with government Organizations	3.04	1.144	-0.090	-0.578
Link6. Linkages with Financial Institutions	3.05	1.125	-0.128	-0.613
Link7. Linkages with Business Mentors	3.05	1.195	-0.039	-0.818
Link8. Linkages with other Entrepreneurs and Businessmen	2.99	1.280	0.043	-1.040
Link9. International Linkages	3.07	1.311	-0.101	-1.078

In the next step, we performed exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) on the 222 observations, these observations were used and had some missing 3% of 228 observations across rows and columns of dataset and they values were excluded from the analysis.

Exploratory Factor Analysis

The exploratory factor analysis shows that 1 factor extracted for entrepreneurial satisfaction, bureaucratic culture and bureaucratic cost, the variance extracted for greater than 50% for all constructs over 70% except for bureaucratic cost. The sample was adequate as indicated by Bartlett's Test of sphericityhas *p-value* of <0.05 for all constructs. The exploratory factor structure was performed on the items and 2 factor structure was found for each set of items see Table 4.

Table 3 KMO Test

Construct	**KMO**	**Bartlett's test Sphericity**	**Variance Explained**
Entrepreneurial Satisfaction	0.735	0	73.29
Bureaucratic Culture	0.72	0	64.0
Links	0.729	0	61.4
Bureaucratic Cost	0.572	0	60.0

Table 4 Rotated Component Matrix

	Component	
Entrepreneurial Satisfaction	*1*	*2*
ES6. I like my business/startup better than the average worker does	*0.883*	
ES5. Most days You are enthusiastic about your work in Business/startup	*0.875*	
ES7. I find real enjoyment in my business/startup	*0.842*	
ES4. You are satisfied with present business/startup in light of your career expectations	*0.778*	
ES2. The chance your business/startup gives you to do what you are best	*0.560*	
(Labelling and Items Omitted)		
ES1. Your present business / startup gives you satisfaction than jobs in other organizations		*0.880*
ES3. Your present business/startup when you consider the expectations you had when you took the business/startup		*0.867*
a. Rotation converged in 3 iterations.		
Bureaucratic Culture	*1*	*2*
Brc2. Bureaucrats are very cooperative towards entrepreneurs / business	*0.905*	
Brc3. I have ease of access of information from government departments	*0.815*	
Brc1. Government rules and procedures are beneficial for entrepreneurs / businessmen	*0.762*	
Brc7. Behavior of staff in government department is always good towards businessmen / entrepreneurs	*0.694*	
Bureaucratic Cost		
Brc5. It takes lot of time in documentation , rules and procedures in government departments		*0.871*
Brc6. It gets costly when we go for registration of company and other procedures		*0.852*
Brc4. There is corruption and practice of bribery in government departments		*0.564*
Extraction Method: Principal Component Analysis.		
Rotation Method: Varimax with Kaiser Normalization.		
a. Rotation converged in 3 iterations.		

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Links	*1*	*2*	*3*
Link7. Linkages with Business Mentors	*0.931*		
Link8. Linkages with other Entrepreneurs and Businessmen	*0.886*		
Link6. Linkages with Financial Institutions	*0.840*		
Link4. Linkages with Industry experts, Technical Persons	*0.536*		
Link3. Linkages with Universities and Academics	*0.524*		
(Labelling and Items are omitted)			
Link1. Linkages with customers		*0.916*	
Link2. Linkages with suppliers		*0.909*	
Link5. Linkages with government Organizations			*0.887*
Link9. International Linkages			*0.857*
Extraction Method: Principal Component Analysis.			
Rotation Method: Varimax with Kaiser Normalization.			
a. Rotation converged in 5 iterations.			

In addition we also performed exploratory factor with pro max rotation for all items and with setting fixed one structure, however, we could not get one factor structure for entrepreneurial satisfaction, linkages and bureaucratic culture. The $\chi 2$ for entrepreneurial satisfaction, Bureaucratic Culture, Links and Bureaucratic Cost was found to be 297.198a (df 6) ($p < 0.001$), 201.829b (df 4) ($p < 0.001$), 88.225b (df 4) ($p < 0.001$), 242.955c (df 4) ($p < 0.001$).

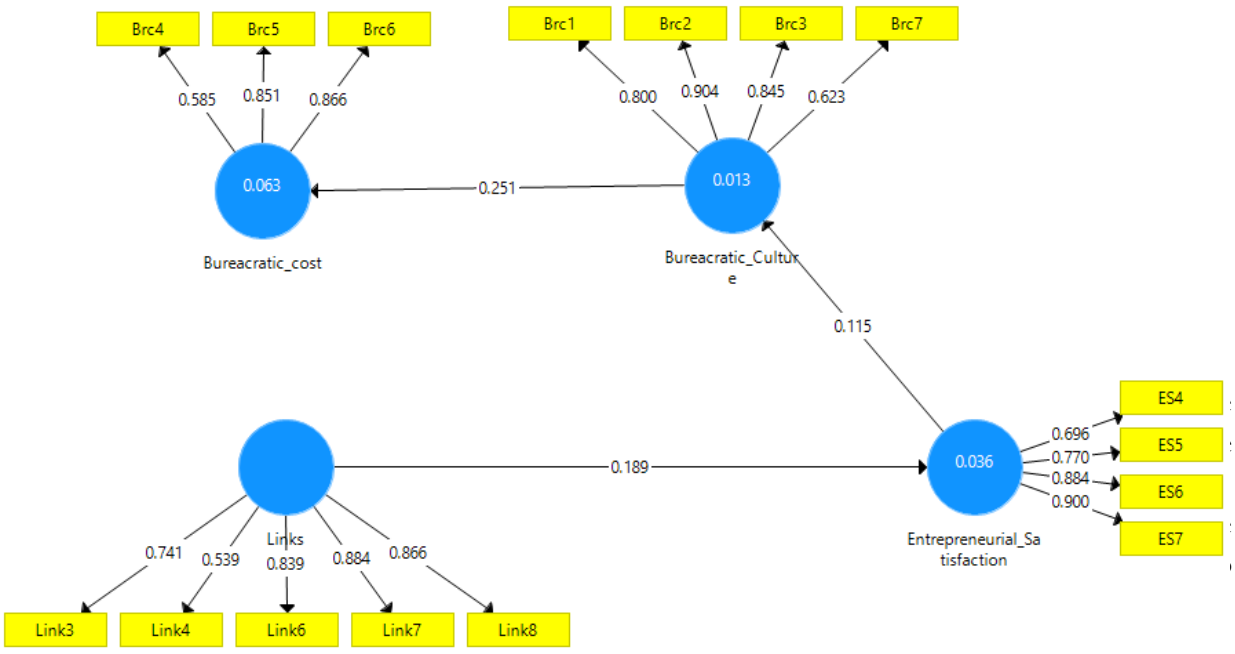

Table 5 Construct Reliability and Validity

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Bureaucratic Culture	0.812	0.853	0.875	0.640
Bureaucratic Cost	0.660	0.703	0.817	0.605
Entrepreneurial Satisfaction	0.849	0.957	0.888	0.667
Links	0.851	0.877	0.886	0.615

Table 6 Fornell-Larcker Criterion for Discriminant Validity

	Bureaucratic Culture	Bureaucratic Cost	Entrepreneurial Satisfaction	Links
Bureaucratic Culture	0.800			
Bureaucratic Cost	0.251	0.778		
Entrepreneurial Satisfaction	0.115	0.197	0.817	
Links	-0.012	0.216	0.189	0.784

Table 7 Variance Inflation Factor

	VIF
Brc1	1.888
Brc2	2.926
Brc3	1.902
Brc4	1.095
Brc5	1.759
Brc6	1.730
Brc7	1.422
ES4	1.648
ES5	2.450
ES6	2.726
ES7	2.024
Link3	1.435
Link4	1.403
Link6	2.456
Link7	4.254
Link8	3.963

Discussion

The aim of this study was to use exploratory factor analysis and confirmatory factor analysis to study the bureaucratic culture, links, and entrepreneurial satisfaction with sample of founders and co-founders startups and firms. The EFA extracted two factor solutions with entrepreneurial satisfaction (5 items and 2 items), so 2 item factor is included, two factor structure was extracted for bureaucratic culture (4 items),

bureaucratic cost (3 items) and 3 factor structure was extracted with 4 items for 1st factor (Links) and 2 factors with 2 items each which are excluded from the further analysis because of two items. The variance extracted was found to be greater 60% for each construct. Confirmatory factory analysis was performed in Smart PLS (PLS-SEM) and Cronbach Alpha was found to be in the range of (0.60-0.85), composite reliability (>0.80) and average variance extracted (0.50) were calculated and found to be in an agreement with the values as suggested from Hair et al., (2016). Another important criteria is discriminant validity of the extracted constructs we have shown that all extracted factor structures have discriminant validity i.e. values at the diagonal should be greater than (0.708)based on Fornell &. Larcker criterion see Table 6.Multicollinearity issues was also checked through VIF criteria and the VIF of all items was found to be <5 thus indicating that there is no multicollinearity issues in our indictors or items Hair et al., (2016). please see Table No.

This result has a weakness that it has small sample size (n=222) of founders and co-founders, and the sample was exclusively from one region of Pakistan i.e. Sindh, another weakness is its poor fit index that is SRMS (0.081), which can further be increased with larger sample size covering many other regions of Pakistan. The sample is those people who are well versed in the concept of entrepreneurship and are working in urban areas of Pakistan and often comes into contact with different government departments and reside in the cities with large concentration of businesses and having growing urban support system for entrepreneurial ecosystem.

Conclusion

This study has presented the results from the sample of founders and co founders of startups for exploring the factor structure of questions on entrepreneurial satisfaction, bureaucratic structure and linkages that may effect the performance of entrepreneurs with a particular entrepreneurial ecosystem, this study was conducted in Sindh, Pakistan with higher proportion of male founders and co-founders of startups and firms. This research has found that all constructs have 2 factor structure and CFA was performed in Smart PLS and we found construct reliability through Cronbach Alpha, composite reliability and AVE within threshold values as recommended by Hair et al., (2016); discriminant validity was also established for factors extracted, further research is needed to generalize the results in other regions of Pakistan with possible effects of regions, gender and the type of startups.

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