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Confirmatory Factor Analysis for CSR perception on stakeholders in SMEs

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Abstract

This is the study done on small and medium sized enterprises (SMEs) who are engaged in the corporate social responsibility (CSR) activities. India is a country of SMEs. It is imperative that India works towards making the smaller enterprises CSR compliant. Employing close to 40% of India's workforce and contributing 45% to India's manufacturing output, SMEs play a critical role in economic development and especially generating millions of jobs. We can extrapolate and comfortably say that the geographical reach through SMEs is vastly higher than through the larger enterprises. In India, prior to the Companies Act, 2013, the CSR was more-or-less voluntary activities and philanthropy. **(indiacsr.in/csr-an-equal-responsibility-of-smes/)**

The objectives of this study are: (a) to assess the perception of CSR initiatives in relation to stakeholders, adopted by the small and medium sized enterprises, leading to an impact on society and (b) build a hypothesized measurement model by using confirmatory factor analysis (CFA) to test statistical significance on CSR perceptions.

AMOS, abbreviated for Analysis of MOment Structures, is a visual program for structural equation modeling and is applied for this study. SEM is a set of statistical techniques that is used to analyze structural relationships. SEM is employed to test a model on observed data from CSR practicing small and medium sized companies of cross-sectors in the vicinity of Bengaluru City, India. For all constrained parameters in the model, AMOS has calculated a modification index. Using modification indices, the model is improved for a better good-fit.

The distinctive feature of CFA is that the factors are from theory, not from statistical results unlike exploratory factor analysis. CFA is conducted with the knowledge about how many factors really exist or which variables belong to a particular construct. The number of factors and the observed variables (indicators) that load on each construct are specified in advance of the analysis. It is helpful in validating a measurement theory.

Keywords: Corporate Social Responsibility (CSR), SMEs, Stakeholders, Goodness-of-fit, Society, Hypothesis, Model, AMOS, Confirmatory Factor Analysis (CFA) and Indices.

1. Introduction

UNIDO (United Nations Industrial Development Organization) on its website on CSR defines "Corporate Social Responsibility as a management concept whereby companies integrate social and environmental concerns in their business operations and interactions with their stakeholders". SMEs need to realize that profit alone will not drive them to become successful. They have to successfully integrate environment and society with economics. The excuse of being small will only prevent the SME from becoming world class[3]. In India, prior to the Companies Act, 2013, the CSR was more-or-less voluntary activities and philanthropy. However, CSR was mandated by virtue of section 135(1) of Companies Act, 2013 and indicative areas of CSR were listed under Schedule VII of the Act.

Small and medium-sized enterprises are non-subsidiary, independent firms which employ less than a given number of employees. This number varies across countries. Small firms are generally those with fewer than 50 employees[4]. The UK definition of SME is generally a small or medium-sized enterprise with fewer than 250 employees. While the SME meaning defined by the EU is also business with fewer than 250 employees, and a turnover of less than €50 million, or a balance sheet total of less than €43 million[5].

Micro, Small and Medium Enterprises (MSME) sector has emerged as a highly vibrant and dynamic sector of the Indian economy over the last five decades. MSMEs not only play crucial role in providing large employment opportunities at comparatively lower capital cost than large industries but also help in industrialization of rural and backward areas, thereby, reducing regional imbalances, assuring more equitable distribution of national income and wealth. MSMEs are complementary to large industries as ancillary units and this sector contributes enormously to the socio-economic development of the country.

In India there are more than 63 million registered and unregistered SMEs. Small and Medium Enterprises are defined in accordance with Section 7 of the Micro, Small and Medium Enterprises Development Act, 2006**.** The threshold for investment in **Small Enterprises** sector ranges between 1 crore and 10 crores while the threshold of turnover ranges between INR 5 crore and INR 50 crores**.** In case of **Medium Enterprises**, the threshold of investment ranges between INR 10 crores and INR 50 crores while the threshold of turnover ranges between INR 50 crores and INR 250 crores**. (Ministry of Micro, Small and Medium Enterprises, GoI)**

[3] indiacsr.in/csr-an-equal-responsibility-of-smes/

[4] https://stats.oecd.org/glossary/detail.asp?ID=3123

[5] www.simplybusiness.co.uk/knowledge/articles/2021/05/what-is-an-sme/

CSR has become so important that many organizations have re-branded their core values to include social responsibility. CSR is broadly grounded in an understanding of business being part of society. It has important effects on eradication of poverty, employment creation and labor practices, environmental protection, education and human development (**Dr. Muhammad Tariq Khan et al, 2012, Universal Journal of Management and Social Sciences Vol. 2, No.7; July 2012**). In the same scale, the concept of stakeholders is also changing and no longer restricted to its traditional concept. It extends to even include environment, education, hospitals, community involvement etc. The CSR practices are seeing a shift from shareholders theory to stakeholder's theory, which perhaps can cater to better society needs.

The last two decades is witnessing a change to the global economic scenario and the expectations of lower and middle class are rising in India. To circumvent such rising expectations of the society, more and more companies should participate in CSR activities. Perhaps it is the time, SMEs begin to change themselves and look into changes in their approach towards the society and environment around them. SMEs should consider CSR as creating positive impact in what they doing through regular practices.

2. Review of Literature

A literature review is an overview of the previously published works on a specific topic. The term can refer to a full scholarly paper or a section of a scholarly work such as a book, or an article (**en.wikipedia.org/wiki/Literature-review**). Although, several reviews of literatures are available for CSR activities, SEM for goodness of fit models and CFA, it is not possible to list out too many in this section. Hence, only a few indicative review of literature is mentioned.

Linh Chi Vo (2011). "Corporate social responsibility and SMEs" in the journal of "Problems and Perspectives in Management", 9(4) has pointed that CSR is now a movement attracting attention. The literature still seems to be focusing disproportionately on large organizations. As SMEs play a crucial role in the European economy and their unique characteristics make it far from applicable for them to employ CSR theories and practices of

large corporations, considerable research is needed to enhance SMEs CSR field.

Amina Kechiche & Richard Soparnot (2012) on "CSR within SMEs: Literature Review", (International Business Research; Vol. 5, No. 7). Their abstract states that, "although CSR has traditionally been associated with big business, the SME business sector is such a significant sector worldwide in terms of the economic, environmental and social impact it makes, that attention has been turned to discussion and analysis of principles and practice of CSR in small and medium size businesses. SMEs are not merely small versions of big businesses, so as a result a particularly fast-growing body of academic work has become focused on commitment to CSR in the sector. As a result, the aim of this article is to set out an analysis of the main work carried out on the subject of CSR in SMEs."

Vethirajan.C, Ramu.C (2019) in his article on "Customers Perception of CSR Impact on FMCG Companies – An Analysis" shows that CSR is actually about making sure that the company can produce on a sustainable base to ensure the equality to all its stakeholders, since CSR has come a long way in India. However, it is hard for individual entities to make changes in the prevailing social structure of the country. But still, organizations have their strategically planning, technical proficiency, human resource, and financial support for delivering socially responsible measures to the society. Though, both the corporates and NGOs should join together for achieving faster social development within a short period.

Ankur Roy, Vishal Vyas and Priyanka Jain(2013) – "SMEs Motivation: Corporate Social Responsibility"; SCMS Journal of Indian Management, January - March, 2013. The abstract is adopted from their publication. The study explores the motivational factors for SMEs to engage in CSR practices. Using structured questionnaire data was collected from 132 responses belonging to SMEs in Rajasthan. The data was applied to confirmatory factor analysis by using AMOSto test the model-fit and unidimensionality of scale items. For a confirmatory factor analysis, four constructs were designed for CSR motivation of SME managers. Four motivational constructs consisted of statements on "Customer Propositions," "Stakeholder Value," "Founder Characteristics and business values," and "Business Motives". The study concluded that SMEs are both willing and able to make significant contributions to support mainly local events and organizations in recognition of their social obligations and economic objectives.

GABOROVA, IVANA, (2020) – "Relationship of Corporate Social Responsibility and Innovation in SMEs: Case Study in selected CEE Countries"; AD ALTA, Journal of interdisciplinary research, stated that CSR has grown in importance since the economic crisis of 2008. As a result of this, businesses tried to find new solutions to economic issues, craving out of it to exploit CSR potential, and more so for many SMEs. The results of the study implies that innovative SMEs can have very strong CSR awareness including proactive approach towards its implementation into its business operations while still not concentrating on performing CSR activities as such. The CEE (Central and Eastern Europe) region comprises of Austria, Czech Republic and Slovakia.

Therefore, from review of literature it can be said that SMEs too can showcase their image and reputation through CSR activities and for the expected general welfare and societal benefits. Hence, the two hypothesesstated are:

H_{01}– There is no significant impact of CSR perception on CSR stakeholders in SMEs.

H_{11}– There is significant impact of CSR perception on CSR stakeholders in SMEs.

H_{02} – The hypothesized CFA model has a good fit.

H_{12} – The hypothesized CFA model does not have a good fit.

3. Research methodology and sampling

The procedure and method adopted to conduct the research was by using a structured questionnaire administered on the respondents of small and medium sized companies in the city of Bengaluru. The questionnaire was designed with four constructs comprising of (a) demographic profile (b) Companies CSR profile (c) CSR effect and domain and (d) CSR perception on stakeholders. The measurement of variables was on a nominal and interval scale. The fourth construct, CSR perception on stakeholders, was the independent interval scale variable. The

stakeholders considered for the study were – Environment, Community, Education and Health. All components of fourth construct were on 5 point Likert interval scale. For all the components of CSR, reliability test was done using Cronbach's alpha score resulting in a score of 0.830 (Table-4.1), which is acceptable.

The sample size was 200 respondents from 15 different CSR implementing companies. The selected companies were divided into 5 small sized companies and 10 medium sized companies in the ratio of 1:2. The respondents comprised of 83 from small sized companies and 117 from medium sized companies. All responses represented different groups, namely, type of company, gender, age, education and income level.

The inependent variables are coded for convenience as:

Environment – EN with sub-codes as EN1 to EN4 being four indicator variables

Community – CO with sub-codes as CO1 to CO4 being four indicator variables

Education – ED with sub-codes as ED1 to ED4 being four indicator variables

Health – HL with sub-codes as HL1 to HL4 being four indicator variables

4. Data analysis and results

The data so gathered from primary source involving respondents from select small and medium enterprises (SMEs) was further analyzed by measures of Cronbach's alpha test, Chi-square test, Independent Sample test, ANOVA, SEM and CFA using SPSS and AMOS. In this study, first goodness-of-fit of measurement model is studied and then the validity and reliability of measurement model is explained through concept of construct reliability.

Table 4.1: Reliability Statistics of CSR perception on stakeholders

Scale Statistics				
Mean	Variance	Std. Deviation	N of Items	Cronbach's Alpha
57.42	58.526	7.650	16	0.830

Table 4.2: Correlation of the dimensions of CSR perception on stakeholders

	EN1	EN2	EN3	EN4	CO1	CO2	CO3	CO4
EN1	1.00							
EN2	.508**	1.00						
EN3	.599**	.559**	1.00					
EN4	.591**	.533**	.604**	1.00				
CO1	.369**	.403**	.411**	.440**	1.00			
CO2	.402**	.388**	.337**	.416**	.574**	1.00		
CO3	.308**	.421**	.274**	.328**	.479**	.624**	1.00	
CO4	.399**	.365**	.432**	.419**	.519**	.532**	.591**	1.00
ED1	-0.01	-0.04	-0.03	-0.05	-0.08	-0.05	0.03	-0.02
ED2	-0.04	0.07	-0.01	0.02	0.02	-0.02	0.07	0.06
ED3	0.03	0.06	0.14	0.10	0.03	0.12	.170*	.153*
ED4	-0.07	-0.08	0.09	-0.03	0.00	-0.04	0.01	0.00
HL1	0.13	.240**	0.02	.139*	.227**	.293**	.235**	.181*
HL2	.423**	.324**	.289**	.258**	.405**	.475**	.325**	.339**
HL3	0.04	.212**	-0.03	0.12	.154*	.251**	.217**	0.10
HL4	0.03	.150*	-0.02	0.09	.182**	.247**	.245**	.186**

…. Continuation of Correlation from Table-4.2

	ED1	ED2	ED3	ED4	HL1	HL2	HL3	HL4

EN1								
EN2								
EN3								
EN4								
CO1								
CO2								
CO3								
CO4								
ED1	1.00							
ED2	.593**	1.00						
ED3	.533**	.563**	1.00					
ED4	.569**	.554**	.604**	1.00				
HL1	.202**	0.14	.192**	0.04	1.00			
HL2	0.06	0.10	.140*	0.05	.471**	1.00		
HL3	.152*	.171*	0.11	0.01	.632**	.312**	1.00	
HL4	.210**	.149*	.166*	0.04	.611**	.389**	.689**	1.00
** Correlation is significant at the 0.01 level (2-tailed).* Correlation is significant at the 0.05 level (2-tailed).								

As per Table-4.2, the correlation of all four factors is moderately positively related.

Table 4.3: Group statistics of frequency distribution and mean among SMEs

	Company type	N	Mean	Std. Deviation	Std. Error Mean
Environment	Small	83	3.834	.6323	.0694
	Medium	117	3.521	.8025	.0742
Community	Small	83	3.861	.6536	.0717
	Medium	117	3.566	.7269	.0672
Education	Small	83	3.650	.6614	.0726
	Medium	117	3.419	.8173	.0755
Health	Small	83	3.714	.5713	.0627
	Medium	117	3.348	.7628	.0705

As per Table-4.3, the mean score and standard deviation of all four factors between small and medium sized companies is significantly different.

Table 4.4: Independent Samples Test on CSR stakeholders

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Diff.	95% Confidence Interval of the Difference	
									Lower	Upper
EN	Equal variances assumed	8.148	.005	2.960	198	.003	.31297	.10573	.10446	.52148
	Equal variances not assumed			3.081	195.768	.002	.31297	.10159	.11262	.51332
CO	Equal variances assumed	7.033	.009	2.949	198	.004	.29521	.10010	.09781	.49260
	Equal variances not assumed			3.003	187.170	.003	.29521	.09830	.10128	.48913
ED	Equal variances assumed	6.099	.014	2.135	198	.034	.23180	.10858	.01768	.44592
	Equal variances not assumed			2.212	194.521	.028	.23180	.10478	.02515	.43845
HL	Equal variances assumed	11.664	.001	3.692	198	.000	.36556	.09902	.17030	.56083
	Equal variances not assumed			3.874	197.387	.000	.36556	.09437	.17946	.55167

In the Table-4.4, the two groups considered were small enterprise and medium enterprise. The decision rule for Levene's test is that, if the p-value is less than significance level ($p \leq 0.05$), the variances are significantly different, so we cannot assume variances are equal and the bottom row of the table is interpreted for t-score; otherwise the top row is interpreted for t. Since all the p-values of four factors are less than significance level ($p < 0.05$) and the t scores are greater than the critical values, they are statistically significant to reject the first of the null hypothesis and alternate hypothesis is accepted that there is impact of CSR perception on stakeholders in SMEs.

Table 4.5: Test of homogeneity of variances on Gender

Test of Homogeneity of Variances				
	Levene's Statistic	df1	df2	Sig.
Environment	.127	1	198	.722
Community	.970	1	198	.326

Education	.273	1	198	.602
Health	.044	1	198	.833

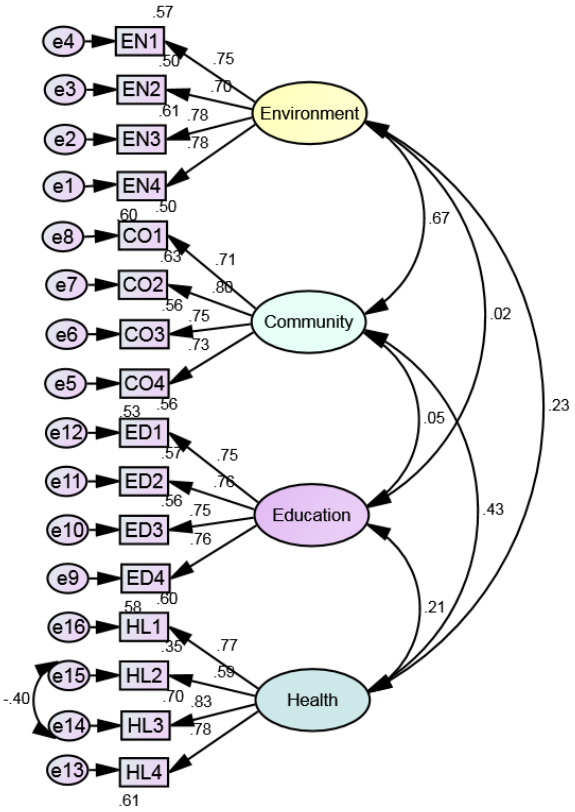
As per Table-4.5, the significance value is > 0.05 for all factors; hence the variance is of the same nature or having homogeneity across group between male and female.

Table 4.6: ANOVA Test between gender groups

ANOVA statistics		Sum of Squares	df	Mean Square	F	Sig.
Environment	Between Groups	.067	1	.067	.119	.731
	Within Groups	112.170	198	.567		
	Total	112.237	199			
Community	Between Groups	.758	1	.758	1.503	.222
	Within Groups	99.805	198	.504		
	Total	100.562	199			
Education	Between Groups	.516	1	.516	.886	.348
	Within Groups	115.439	198	.583		
	Total	115.955	199			
Health	Between Groups	.865	1	.865	1.716	.192
	Within Groups	99.885	198	.504		
	Total	100.750	199			

As per Table-4.6, the significance value is > 0.05 for all factors; hence not statistically significant. So, the two means between groups is significantly different.

Figure-1: CFA for CSR perception on stakeholders (4 measurement model)



In the above Figure-1, the factors considered are Environment (having 4 indicator variables marked as EN1 to EN4), Community (having 4 indicator variables marked as CO1 to CO4),

Education (having 4 indicator variables marked as ED1 to ED4), and Health (having 4 indicator variables marked as HL1 to HL4). The indicator variables are the exogenous variables. The entire four measurement model is associated with measurement error items labeled from e1 to e16. The value of all the components of CSR perception on stakeholders are greater than the rule of thumb of 0.50 as shown in path diagram in Figure-1 and Table-5.3.

5. Notes for Model

a) Table-5.1: Computation of degrees of freedom (Default model)

Number of distinct sample moments:	136
Number of distinct parameters to be estimated:	39
Degrees of freedom (136 - 39):	97

b) Table-5.2: Result (Default model)

Minimum was achieved

Chi-square	191.945
Degrees of freedom (DF)	97
Probability level	0.000

The p-value as per Table-5.2 is 0.000 which is less than the significance level of 0.05 ($p < 0.05$) and the $\chi^2(97)$ value is 191.945 which is not significant given the degree of freedom. In the model fit summary, shown later, the chi-square of minimum discrepancy (CMIN/DF) is 1.979 which is < 5.000, indicating significance of the model.

c) Estimates (Group number 1 - Default model)

Table-5.3: Scalar Estimates (Group number 1 - Default model)

Indicator Variables		Latent Variables	Unstandardized Regression Weights				Standardized Reg. Weights
			Estimate	S.E.	C.R.	P	Estimate
En4	<---	Environment	1.000		1.000		.777
En3	<---	Environment	1.052	.099	1.052	***	.778
En2	<---	Environment	.861	.089	.861	***	.705
En1	<---	Environment	1.017	.099	1.017	***	.752
Co4	<---	Community	1.000		1.000		.725
Co3	<---	Community	1.042	.109	1.042	***	.748
Co2	<---	Community	1.156	.114	1.156	***	.796
Co1	<---	Community	1.034	.113	1.034	***	.708
Ed4	<---	Education	1.000		1.000		.758
Ed3	<---	Education	.941	.096	.941	***	.751
Ed2	<---	Education	.926	.094	.926	***	.758
Ed1	<---	Education	.974	.099	.974	***	.751
Hl4	<---	Health	1.000		1.000		.783
Hl3	<---	Health	.931	.084	.931	***	.834
Hl2	<---	Health	.711	.095	.711	***	.588
Hl1	<---	Health	.958	.086	.958	***	.772

As per Table-5.3, the P-value is *** meaning 0.000 which is less than significance value ($p < 0.05$), which indicates estimates are significant and there is a statistical significance of the components. The critical ratio (CR) is > than + or -1.96 (at 5%), so it is significant. Further, Table-5.3 also shows estimates of standardized weights for the indicator variables which shall be used as factor loading for construct reliability and is greater than significance value of ≥ 0.50.

Table-5.4: Variances (Group number 1 - Default model)

	Estimate	S.E.	C.R.	P	Squared Multiple Correlations	
Environment	.489	.080	6.095	***	Hl1	.596
Community	.375	.067	5.551	***	Hl2	.346
Education	.529	.091	5.814	***	Hl3	.696
Health	.538	.087	6.201	***	Hl4	.613
e2	.353	.048	7.307	***	Ed1	.564
e3	.367	.044	8.275	***	Ed2	.574
e4	.389	.050	7.718	***	Ed3	.564
e5	.337	.042	8.066	***	Ed4	.575
e6	.321	.041	7.787	***	Co1	.502
e7	.289	.041	6.986	***	Co2	.634
e8	.398	.048	8.250	***	Co3	.559
e9	.391	.053	7.327	***	Co4	.526
e10	.362	.049	7.450	***	En1	.565
e11	.336	.046	7.335	***	En2	.497
e12	.388	.052	7.446	***	En3	.605
e14	.204	.037	5.515	***	En4	.604
e15	.514	.060	8.524	***		
e16	.335	.044	7.629	***		
e13	.340	.046	7.420	***		
e1	.321	.044	7.320	***		

As per Table-5.4, the P-value of variances is *** meaning 0.000 which is less than significance value ($p < 0.05$), which indicates estimates are significant and there is a statistical significance of the variables. The critical ratio (CR) is > than + or -1.96 (at 5%), so it is significant. Squared multiple correlation is the coefficient of determination which is defined as the proportion of the total variation explained by the model. It can also be said, a squared multiple correlation or R^2 for the regression equation indicates the proportion of variance in the dependent variable accounted for by the set of independent variables in the multiple regression equation. All estimates of R^2 are statistically significant.

d) Modification Indices

Modification indices may be used in the model in order to improve a better model fit. It may also be helpful in estimating the more likely relationship between variables.

Modification Indices (Group number 1 - Default model)

Table-5.5: Co-variances (Group number 1 - Default model)
(After modification indices is applied)

			Estimate	S.E.	C.R.	P
e14	<-->	e15	-0.130	0.034	-3.853	***

As per Table-5.5, the p-value is ***, that is less than the significance value. The covariance estimate is -3.853 standard errors below zero. The probability of getting a critical ratio as large as -3.853 in absolute value is less than 0.001. In other words, the covariance between e14 and e15 is significantly different from zero at the 0.001 level (two-tailed).

e) Model Fit Summary

Table-5.6: Statistics of CMIN, RMR, GFI and AGFI

Model	NPAR	CMIN	DF	P	CMIN/DF	RMR	GFI	AGFI
Default model	39	191.945	97	.000	1.979	.062	.896	.854

Model	NPAR	CMIN	DF	P	CMIN/DF	RMR	GFI	AGFI
Saturated model	136	.000	0			.000	1.000	
Independence model	16	1502.326	120	.000	12.519	399	.319	.352

Table-5.7:Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI	RMSEA
Default model	.872	.842	.932	.915	.931	.070
Saturated model	1.000		1.000		1.000	
Independence model	.000	.000	.000	.000	.000	.241

Table-5.8: Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI	PGFI
Default model	.808	.705	.753	.638
Saturated model	.000	.000	.000	
Independence model	1.000	.000	.000	.352

Table-5.9: Model fit summary and statistic measurement

Model Fit Types	Test Indices	Result	Test Standard
Absolute Fit Measurement	Chi-square value/DF	1.979	≤ 5.00 (Hair et al., 1998)
	RMSEA	0.070	≤ 0.08 (Hair et al. 2006)
	GFI	0.895	≥ 0.90 (Hair et al. 2006)
	AGFI	0.853	≥ 0.90 (Hu and Bentler, 1999)
Incremental Fit Measurement	NFI	0.872	≥ 0.90 (Hu and Bentler, 1999)
	RFI	0.842	≥ 0.90 (Hu and Bentler, 1999)
	IFI	0.932	≥ 0.90 (Daire et al., 2008)
	TLI	0.915	≥ 0.90 (Daire et al., 2008)
	CFI	0.931	≥ 0.90 (Daire et al., 2008)
Parsimonious Fit Measurement	PNFI	0.705	≥ 0.05 (James et al. 1982)
	PCFI	0.753	≥ 0.05
	PGFI	0.638	≥ 0.05

As per Table-5.9 the statistics measurement of different test indices are shown for goodness of fit. Theχ^2/DF value is 1.979 which is less than 5.00, indicating it is a good fit. The Goodness of Fit Index (GFI) value is 0.895 and Adjusted Goodness of Fit Index (AGFI) value is 0.853, which is close to test standard of ≥ 0.9, indicating approximately a good fit. The calculated Tucker Lewis Fit Index (TLI) value is 0.915 and Comparative Fit Index (CFI) value is 0.931, indicating that it is a perfectly fit and it is also ascertained that Root Mean Square Error of Approximation (RMSEA) value is 0.070 which is less than 0.08 indicating a good fit.

6. Confirmatory Factor Analysis (CFA)

In statistics, confirmatory factor analysis is a special form of factor analysis, most commonly used in social research. It is used to test whether measures of a construct are consistent with a researcher's understanding of the nature of that construct (**Wikipedia**). So, Confirmatory Factor Analysis allows the researcher to find out if any relationship exists between a set of observed variables and their underlying constructs. In this study, latent variables for indicator variables are grouped into EN for Environment, CO for Community, ED for Education and HL for Health. It is a four factor (or measurement) model.

Table-6.1: Correlations: (Group 1 - Default model)

			Estimate
Environment	<-->	Education	.017
Environment	<-->	Health	.179
Community	<-->	Education	.047
Community	<-->	Health	.430
Environment	<-->	Community	.670
Education	<-->	Health	.205

Table-6.2: Factor loading and calculation of Average Variance Extracted (AVE)

Indicator Variables	Standardized Loading (Factor Loading)				Square of FL	Sum of squared FL	Number of indicator	Avg. Variance Extracted	Square-root of AVE
EN4	.777				0.604				
EN3	.778				0.605				
EN2	.705				0.497				
EN1	.752				0.566	2.272	4	0.568	0.754
CO4		.725			0.526				
CO3		.748			0.560				
CO2		.796			0.634				
CO1		.708			0.501	2.220	4	0.555	0.745
ED4			.758		0.575				
ED3			.751		0.564				
ED2			.758		0.575				
ED1			.751		0.564	2.277	4	0.569	0.755
HL4				.783	0.613				
HL3				.834	0.696				
HL2				.588	0.346				
HL1				.772	0.596	2.250	4	0.563	0.750

Construct Reliability

Construct reliability is a measure of internal consistency in scale items, much like Cronbach's alpha (Netemeyer, 2003). It is an "indicator of the shared variance among the observed variables used as an indicator of a latent construct" (Fornell&Larcker, 1981).

There are two subsets of construct validity: Convergent construct Validity and Discriminant construct Validity. Convergent construct validity tests the relationship between the construct and a similar measure; this shows that constructs which are meant to be related are related. Discriminant construct validity tests the relationships between the construct and an unrelated measure; this shows that the constructs are not related to something unexpected. In order to have good construct validity one must have a strong relationship with convergent construct validity and no relationship for discriminant construct validity.

Source: (Ginty A.T. (2013) Construct Validity. In: Gellman M.D., Turner J.R. (ed.) Encyclopedia of Behavioral Medicine Springer, New York, NY. https://doi.org/10.1007/978-1-4419-1005-9_861).

The threshold for the test results for the two validity tests are:

- For Convergent Validity, AVE should be > correlation coefficient of 0.50.
- For Discriminant Validity (DV), square root of AVE should be > the latent variables correlation.

Table-6.3: Discriminant Validity

Indicator Variables	Discriminant Validity			
	ENV	COM	EDU	HLT
EN	0.754			
CO	0.670	0.745		
ED	0.017	0.047	0.755	
HL	0.225	0.430	0.205	0.750

Conclusion: The second of the null hypothesis is accepted for the model to be fit. The SEM is estimated as over-identified model and all the goodness-of-fit parameters for the model, as per above model fit summary, are significant. The confirmatory factor analysis (CFA) results are also significant. As per Table 6.2, the standardized loading (or factor loading) is shown for calculating average variance extracted (AVE). As per the AVE calculations, all four factors value is > 0.50. So the convergent validity is significant. Also in Table-6.2, the square root of AVE is calculated for discriminant validity. As per Table-6.3, the calculated square root of AVE is > than the latent variables correlation. So there exists discriminant validity.

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