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FACTOR ANALYSIS: A STUDY OF PERSONALITY TRAITS OF IT SECTOR EXECUTIVES

Parminder Kaur

Assistant Professor, School of Commerce and Management, Sri Guru

Granth Sahib World University, Fatehgarh Sahib.
Email: parminderkaur263@gmail.com
Mobile :- 8360438646

Abstract
Investigating the essential personality characteristics of CEOs is the goal of the current study. An organization's performance and development are significantly impacted by the personalities of its executives, who comprise the upper echelon of management. This study looked at executive personality qualities in an effort to identify patterns and determine their relative significance.

Keywords:- Factor, Communalities, Factor loading, Eigen-value, Total Variance Explained Big five personality traits.

In the present time of increasing unemployment, organizations are finding it very difficult to select a skilled and qualified workforce, so as to establish a perfect match between job and employee. Selecting the workforce that can help the organization to take leverage over its rival firms to develop competitive advantage has become a great challenge. The success of any firm can be measured from its profitability condition, which results from the effectiveness of its employee's performance (Chung et al., 2023) Therefore selection of the best suitable candidate with skills/traits essential for successful job performance is primitive, as the efficient working of a firm is a direct function of performance of its employees. To understand the relative importance of the personality traits of IT sector executives, in-depth study of existing literature was undertaken by the researcher and identified numerous variables. Big five trait theory also known as the five factor model has its roots in the year 1884, when **Sir Francis Galton** suggested comprehensive classification of human personality. He brought into play a lexical hypothesis also called a sedimentation hypothesis to understand the notion of human personality

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and is the founding stone of the Big Five Personality Model. The lexical hypothesis hypothesizes two assumptions:

- Core personality traits/characteristics of an individual's personality will become part and parcel of their language.
- Single word encoding of these core personality characteristics.

Gordon Allport and S. Odbert (1936) further investigated the **Galton** hypothesis identified 4504 adjectives descriptive of observable and permanent traits and organised them into three levels in his trait theory known as Allport's trait theory. The three were

- Cardinal trait- It refers to that trait which is dominant in one's personality and is leading sentiments, obsessions or passion.
- Central trait- It is that trait which is found in every individual's personality to some degree, forms the basic structure of human personality but is not that core part of personality as a cardinal trait is.
- Secondary trait- These are those personality traits which appear on the surface under certain circumstances only. For example only close friends know whom we like and dislike.

Raymond Cattell (1940) reduced the 4500 adjectives given by Allport, retaining only 171 and developed self-report instruments to give a picture of human personality. The instrument was called the Sixteen Personality Factor Questionnaire (16PF Questionnaire).

Ernest Tupes and Raymond Christal (1961) categorised these traits into five broad factors namely:- surgency, agreeableness, dependability, emotional stability and culture. Dependability was renamed as conscientiousness. During the 1960s Walter Mischel argued that personality instruments can't predict the human personality as behaviours are unstable and they keep changing with changing circumstances (McCrae & John, 1992). This derailed the interest of

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psychologists from the five factor model. But faith in the five factor model was reinstalled by Goldberg (1981), he supported the lexical hypothesis and came out with his Big Five Model.

Big Five Personality Traits Model

Openness to experience (inventive vs. cautious): - It describes the degree to which a person is innovative, creative and imaginative. People with high levels of openness to new experiences strive for self-actualization, think beyond the box, and follow their aspirations.

Conscientiousness (efficient vs. easy going): - Individuals with high conscientiousness are self-disciplined, organised, self-motivated and are well planned. They plan their course of action well in advance and don't rely on spontaneous actions.

Extraversion (outgoing vs. reserved): - They are energetic, bring positive vibes, talkative and are good at socialising. They like to be surrounded by people and want to be the centre of attraction.

Agreeableness (friendly vs. detached): - such individuals are trustworthy and harmless, are cooperative in nature whereas those with low agreeableness are challenging, competitive and cannot be trusted easily.

Neuroticism (sensitive vs. confident): - It refers to the degree of impulse control and emotional stability. High neuroticism signifies that the individual is more likely to be irritable, anxious, fearful, stressed and depressed.

The Big five personality trait model tries to explain the relationship between personality traits and behaviour. Each of the big five traits reflects two different but associated aspects of personality.

Further factor analysis was performed to reduce the number of variables to small meaningful and manageable factors to achieve the purpose of the study. Factor analysis is also known as data reduction technique. Factor analysis is primarily used as a

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(a) technique to extract a small number of factors from a large data set (as data reduction technique).

(b) tool to understand the hidden pattern of the data set (as variables with high correlation are clubbed under one factor).

Key terminology used in factor analysis

Factor- Factor can be defined as the dimension drawn out of a large data set, which may include 'n' number of observed variables. Variables within one factor show high internal correlation whereas they must have weak correlation with constructs included in other variables. Factor analysis is used to extract as many significant variables as possible so as to draw inference from data. one factor is extracted at a time and then data is evaluated to find out the presence of additional factors. First extracted factor is always the most important factor explaining maximum variance in the latent variable. Each successive factor explains less and less the latent variable. Statistical independence of factors so obtained is essential.

Eigen value- Eigen value is the measure of variance in a measured variable as explained by factor. It is also a measure of the strength of a factor. Usually Factors with eigen value greater than one are retained.

Factor loading- Factor loading also called as factor score is the coefficient of correlation between every statement and factor. A positive factor loading indicates that there exists a positive correlation between the statement and a factor whereas negative factor loading indicates the presence of negative relation between the two. Factor scores are used for further analysis.

Rotation of factor- Initial solution is rotated so as to make interpretation easy as initial factor solutions are very difficult to interpret. Varimax rotation is used to extract statistically independent factors and it maximises variance with each factor. variance is maximum when lowest factor loading to close to zero and highest factor loading is close to unity. There should be no cross loading i.e statement that appears in one factor should not have high loading in another factor.

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Principal component analysis (PCA)- Principal component analysis is used for extraction of factors, it pertains to finding those factors weights (factor scores) that explains the maximum portion of the total variance i.e first factor explains the maximum variance. The variance explained by the first factor is subtracted from the initial input and gives the residual. The next factor explains the variance not explained by the first factor.

2.2 Exploratory Factor analysis results

Descriptive Statistics		
	Mean	Std. Deviation
Open1	4.25	.731
open2	4.46	.739
open3	4.30	.727
open4	4.38	.785
open5	4.34	.801
open6	4.16	.769
open7	4.23	.730
extraver1	4.17	.792
extraver2	4.20	.817

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extraver3	4.21	.854
extraver4	4.11	.877
extraver5	4.15	.812
evtraver6	4.09	.860
extraver7	3.96	.833
Agreable1	4.22	.819
Agreable2	4.37	.744
Agreable3	4.32	.792
Agreable4	4.38	.711
Agreable5	3.89	.799
Agreable6	3.92	.822
Neuro1	2.23	1.126
Neuro2	2.15	.969
Neuro3	2.53	1.122
Neuro4	2.45	1.168
Neuro5	2.27	.931
Neuro6	2.58	1.203

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Neuro7	2.45	1.067
Neuro8	2.26	.997
Cons1	4.09	.920
Cons2	3.33	1.145
Cons3	3.63	1.159
Cons4	3.44	1.080
Cons5	3.96	.918

2.2.1 Descriptive statistics

The mean score for all observed variables comes between 2.58 to 4.46 which indicates all personality aspects are integral to personality traits of IT sector executives except for few with mean value less than 2.58. Also the deviation from mean score is very low which validates all dimensions mean scores.

2.2.2 Bartlett's Test of Sphericity

The above-mentioned test is used to test the presence of correlation among the observed variables for factor analysis to work as in the absence of significant relationships among variables factor analysis becomes an ineffective tool for data analysis. The test is also used to establish the reliability and validity of the solution obtained by the way of factor analysis (Hair et.al. 2009). Therefore for factor analysis to work Bartlett's test of sphericity should be significant, say $p<0.05$.

2.2.3 Test hypothesis regarding interdependence between Variables

Null hypothesis Ho: There is no statistically significant relationship between the variables constituting personality traits of IT sector executives.

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Alternative hypothesis Ha: There is a statistically significant relationship between the variables constituting personality traits of IT sector executives.

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.872
Bartlett's Test of Sphericity	Approx. Chi-Square	4751.632
	df	276
	Sig.	0.000

The above table shows Bartlett's test of Sphericity is significant at 0.000 indicating the presence of significant relationship between variables to run factor analysis and also signals out the acceptance of null hypothesis. Therefore the null hypothesis is rejected.

2.2.4 Measure of Sampling Adequacy (MSA)

The above-mentioned test is used to measure the suitability of the data for the conduct of factor analysis as it estimates the adequacy of the sample for each variable in the data set and for the whole model. The KMO statistics lie between 0 to 1. KMOvalue between 0.8 to 0.89 is considered good whereas KMO value above 0.90 is considered marvelous. In the above table the KMO value is 0.872 indicating the sample adequacy and suitability of the data set for performing factor analysis.

2.2.5 Method of Factor Analysis

Factor analysis is a data reduction technique used to reduce a large number of variables to few meaningful and manageable factors. Statements showing high correlation are clubbed under one factor i.e variables within the factor shows high correlation. Cross loading of statements is barred in factor analysis as cross loading indicates that statement estimates more than one factor which will lead to the problem of multicollinearity.

There are two methods of factor analysis namely Common Factor Analysis and Principal component analysis. Common factor analysis is used when the objective is to drawout hidden or

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underlying dimensions whereas Principal component analysis is used to reduce a large data set to a small number of factors. As the primary objective of the present study is data reduction, the PCA method has been used for further analysis.

2.2.6 Method of factor rotation

Rotational and Unrotated factors are two techniques available for rotation of factors. Un rotated factor solution achieves the object of data reduction but the results produced by this technique are not easy to interpret as under this method of factor rotation factors are extracted in the order of their variance. The unrotated matrix factor pattern becomes difficult to understand.

There are two methods of rotation available namely orthogonal rotation and oblique rotation. Oblique rotation assumes that the factors are correlated or interdependent whereas in orthogonal rotation it is assumed that all the components in the model are uncorrelated and independent of each other. As the objective of the study is to find statistically independent factors therefore researchers have used orthogonal rotation.

Quartimax, equimax and varimax are three different approaches available for conducting orthogonal rotation. Quartimax rotation method simply reduces the number of factors that are needed to describe each variable and makes it easy to draw interpretation. Equimax rotation method is the combination of two methods namely:- Varimax and Quartimax. This method of rotation minimizes both the number of variables that load significantly on a factor and the number of factors that are required to describe the variables. Varimax rotation is a method in which the number of factors that have high factor loading are minimized so as to make the interpretation of results of factor analysis easy and effortless. The researcher has used varimax rotation. Further it becomes extremely easy to interpret the construct (factor) and variable (item) relation when factor loadings are close to -1 or +1, indicating a clear negative or positive relationship between construct and its item whereas 0 factor loading means no association at all.

2.2.7 Communalities

Communality can be described as the proportion of variance of all statements as explained by the factor, it is the sum of squared factor loadings of the statements. Initially communalities are 1 as

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it points out the common variance shared among the variables. Extracted values of communalities show the variance in variables as explained by the retained factors and is always less than 100%. The minimum acceptable threshold limit for communalities is 0.5 (Hair et.al. 2009). If a communality value for a variable is less than 0.5 or exhibits significant loading on more than one factor then that particular variable is dropped out or is recalculated. High communality value indicates greater degree of variance explained by the variable whereas the low values indicates that the variable is unable to explain variance and is statistically independent and can not be teamed up with other variables. Communality is the common variance that ranges from 0 to 1, high communality shows that a factor is able to explain high levels of variance in items. Common variance is the variance shared among all the variables in the data set. Statements that are highly correlated with each other will have high common variance. Variance that is not shared is known as unique variance and variance that is not explained by the factor is known as error variance, it may have occurred due to error in the measurement.

Communality Statistics for personality traits

Communalities		
	Initial	Extraction
Open1	1.000	.553
open2	1.000	.525
open3	1.000	.539
open4	1.000	.580
open5	1.000	.528
open6	1.000	.518
open7	1.000	.504
extraver1	1.000	.774
extraver2	1.000	.734
extraver3	1.000	.583
Agreable1	1.000	.653
Agreable2	1.000	.727
Agreable3	1.000	.701
Agreable4	1.000	.682
Neuro1	1.000	.599
Neuro2	1.000	.553

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Neuro3	1.000	.657
Neuro4	1.000	.744
Neuro6	1.000	.695
Neuro7	1.000	.629
Neuro8	1.000	.596
Cons2	1.000	.593
Cons3	1.000	.686
Cons4	1.000	.665
Extraction Method: Principal Component Analysis.		

The above table shows the initial and extracted communality values for all the variables. It can be observed that communalities for all variables are greater than the threshold limit of 0.5, hence the above data is fit for further analysis.

2.2.8 Eigenvalue and Total Variance Explained

One of the pertinent obstacles faced by the researchers is to decide on the number of factors that should be retained or extracted. Though no quantitative base has been developed till today yet some checkpoints\ threshold limits have been used time and again by the researchers to extract the factors. Factors with eigenvalue greater than one are retained for further analysis and rest are dropped out. Eigenvalue is a measure used to explain the variance in variables as explained by the factor. Most eigenvalues are positive as negative eigenvalue is an indicator of an ill-structured model. Eigenvalues that are close to unity indicate high variance explained whereas eigenvalues near to zero points out that there exists a problem of multicollinearity between the variables. It is the sum of squared factor loadings of all the variables for each factor. Table 5.1 shows that the eigenvalue of the first five factors is greater than 1 and the same can be confirmed from scree plot where number of components are taken on X-Axis and eigenvalues are taken on Y-Axis. First factor always explains the maximum variance and the variance not explained by the first factor is explained by the second factor, like this the last factor retained explains the least variance. In the table TVE first five factors together are able to explain 62.579% of variance in variables. First component alone explains 25.603% variance whereas the last retained factor explains only 8.542% variance in independent variables. Only five factors have been retained as the 6th factor's eigenvalue is 0.766 only.

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Total Variance Explained

Total Variance Explained									
	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.145	25.603	25.603	6.145	25.603	25.603	4.299	17.911	17.911
2	3.850	16.040	41.643	3.850	16.040	41.643	3.770	15.707	33.618
3	1.975	8.227	49.870	1.975	8.227	49.870	2.781	11.587	45.205
4	1.722	7.174	57.044	1.722	7.174	57.044	2.120	8.833	54.038
5	1.328	5.535	62.579	1.328	5.535	62.579	2.050	8.542	62.579
6	.766	3.193	65.772						
7	.705	2.937	68.709						
8	.668	2.784	71.493						
9	.628	2.619	74.112						
10	.598	2.491	76.603						
11	.587	2.446	79.049						
12	.556	2.318	81.367						
13	.515	2.147	83.513						
14	.492	2.049	85.562						
15	.468	1.951	87.513						
16	.440	1.834	89.347						
17	.416	1.735	91.082						
18	.412	1.717	92.800						
19	.354	1.474	94.273						
20	.333	1.388	95.661						
21	.319	1.329	96.990						
22	.259	1.078	98.068						
23	.247	1.029	99.097						
24	.217	.903	100.000						
Extraction Method: Principal Component Analysis.									

The table above provides the information about 24 variables

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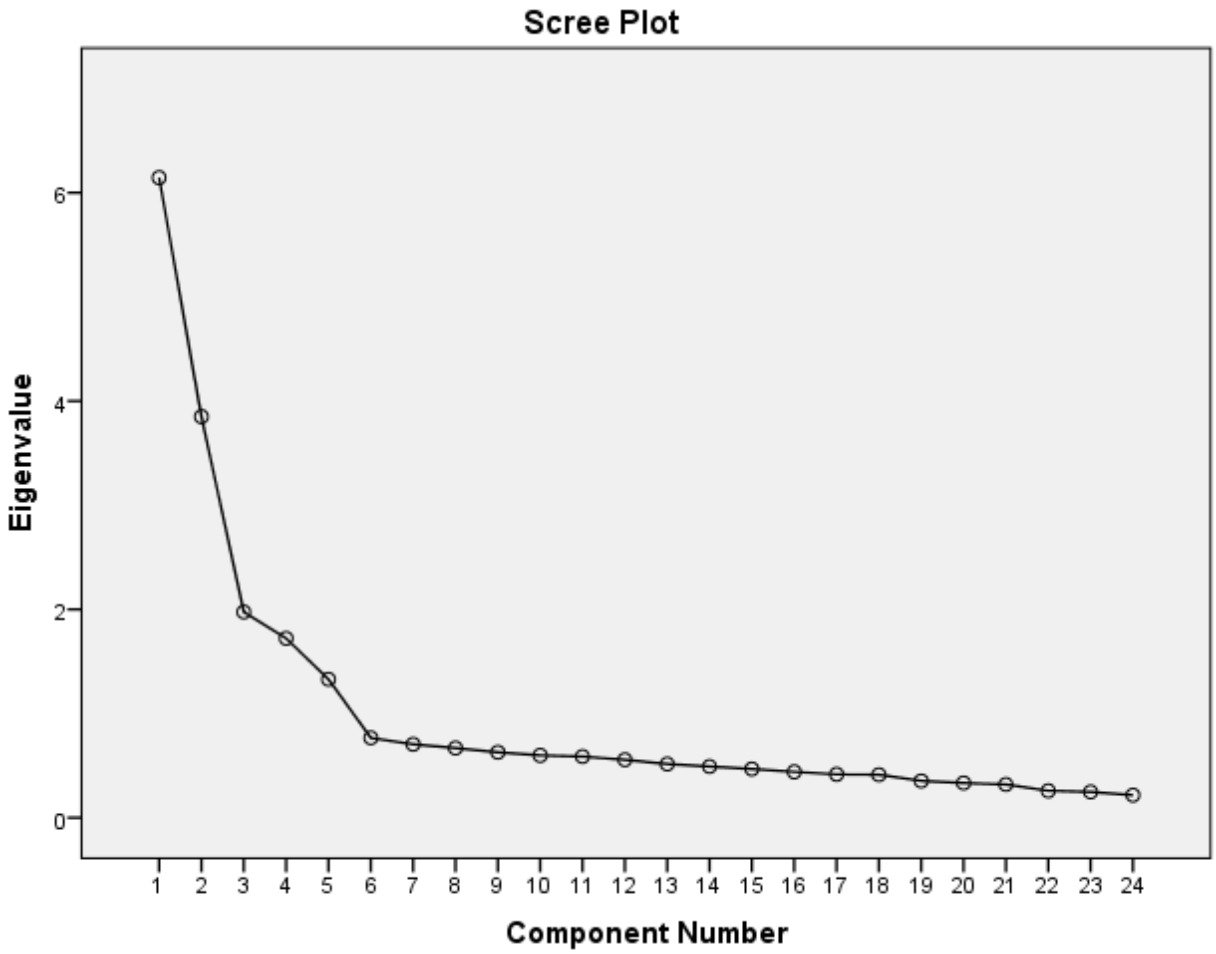

The above diagram gives a graphical presentation of eigenvalues and number of components where the number of components are taken on X-Axis and eigenvalues are taken on Y-Axis.

2.2.9 Rotated Component Matrix

Rotated component matrix represents the power of relationship between a factor and the observed variable (statements). It also indicates the membership of an item under one factor. Association of an item with a particular factor depends on factor loading, an item is a member of that factor on which it loads highest. The table rotated component matrix exhibits the number of significant factors formed and the number of items included under each factor.

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Rotated Component Matrix[a]					
	Component				
	1	2	3	4	5
Open1		.690			
open2		.685			
open3		.694			
open4		.727			
open5		.682			
open6		.711			
open7		.690			
extraver1				.813	
extraver2				.771	
extraver3				.720	
Agreable1			.785		
Agreable2			.811		
Agreable3			.800		
Agreable4			.740		
Neuro1	.728				
Neuro2	.694				
Neuro3	.804				
Neuro4	.855				
Neuro6	.832				
Neuro7	.783				
Neuro8	.715				
Cons2					.765
Cons3					.808
Cons4					.803
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.					
a. Rotation converged in 6 iterations.					

The above table shows that neuroticism has come up as the most important personality trait of IT sector executives. Neurotic people are more likely to experience negative feelings easily such as stress, anxiety, depression, anger, frustration, worry, fear etc. such people are often over conscious about themselves and are shy. Such results can be attributed to the fact that the Indian IT sector has had stupendous growth in the past few years hence people working in the IT sector are facing constant pressure to efficiently deliver the services (Padma et.al 2014). Openness to

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experience has come up as second prominent personality traits in IT sector executives. Employees working in the IT companies are highly intellectual and professionally qualified to take up jobs with high responsibility and stress. such people are open to new ideas, are creative and have imaginative thinking. The results of the above study have fully supported the available literature, IT sector executives score high on openness to experience. Agreeableness is the third important personality trait of IT sector executives reflecting that they keep empathy with their coworkers and put efforts in working as a team but fail to propound their own desire and preferences. Factor analysis results depict that extraversion is not a very important personality trait of IT sector executives. People that score high on extraversion are very talkative, loud and gregarious. This factor is able to explain only 7.174% of variance. Conscientiousness is the fifth factor explaining only 5.535% variance. People who score high on conscientiousness are goal oriented, farsighted and self-disciplined. The results here are contrary to what was presumed, reasons for such results could be that IT sector executives have to work in restrained environments as they are restricted from thinking out of the box, have to stick to the rules and boundations of the organization and hence become obedient and rule obeying employees.

3.1 Results of Confirmatory Factor Analysis

AMOS 18 and PASW 19 were used to analyze the data using covariance based Structural Equation Modeling (SEM). Both reliability and validity of the constructs can be assessed simultaneously using SEM analysis (Landis et al. (2000)). Construct reliability and validity has a significant effect on the conceptual model being tested. Confirmatory factor analysis was used to establish the reliability and validity of the construct. After establishing reliability and validity we move further to hypothesis testing.

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1.1 Measurement Model

The degree to which the observed or the measured items actually reflect the unobserved or the latent construct is called construct validity. Construct validity is examined through convergent validity and discriminant validity. Likewise, convergent validity gets established in three different ways:

(1) Composite reliability should be greater than 0.70 (Hair et al., 2006).

(2) Average Variance Extracted should be greater than 0.50 (Fornell and Larcker, 1981).

(3) Factor loadings should be greater than 0.70 (Hair et al., 2006).

Since the majority of the factor loadings were greater than 0.70, therefore convergent validity gets established. The average variance extracted (AVE) of the constructs ranged from 0.530 to 0.733 and was above the minimum hurdle of 0.50 (Fornell and Larcker, 1981). For all the three constructs composite reliability was in the range of 0.848 to 0.942 and was above the threshold of 0.70 (Hair et al., 2006).

The initial CFA, with all latent factors modeled simultaneously as correlated first-order factors, indicated a reasonable model fit, cmin/df = 2.296, p < .05, goodness-of-fit index (GFI)= .907, AGFI= 0.885, comparative fit index (CFI) = .931, Tucker–Lewis index (TLI) = .992, root mean square error of approximation (RMSEA) = .054. Thus, CFA confirms our preconceived measurement theory through construct validity and acceptable model fit indices.

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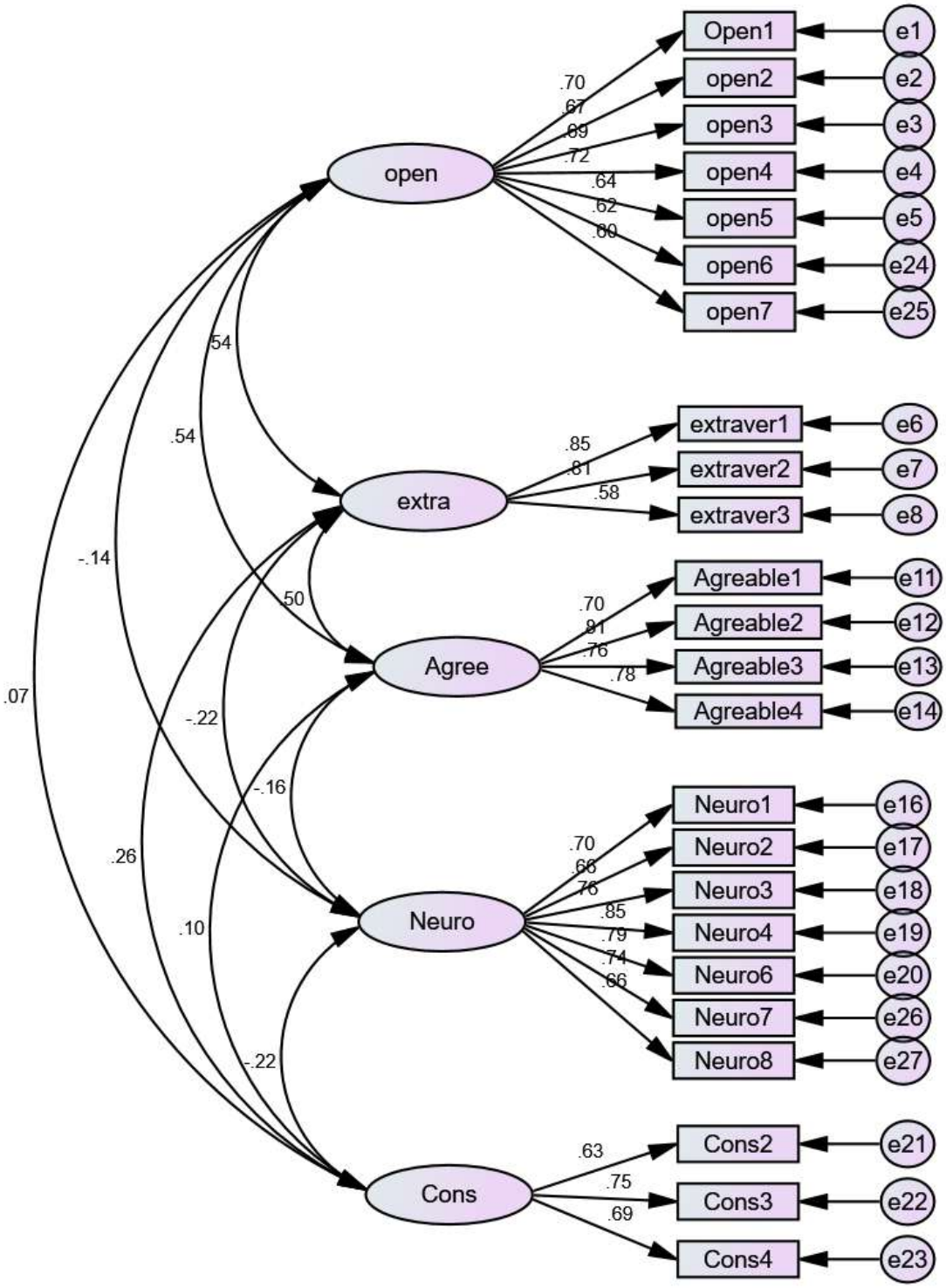

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Conclusion

The most significant personality attribute identified for CEOs in the IT sector is neuroticism. Negative emotions such as stress, anxiety, despair, rage, annoyance, concern, fear, and so forth are more common among neurotic persons. These folks are shy and frequently very self-conscious. These outcomes can be explained by the phenomenal expansion the Indian IT industry has had in recent years; as a result, employees in this field are under constant pressure to provide services quickly and effectively (Padma et.al 2014). Among CEOs in the IT sector, openness to experience has emerged as the second most important personality quality. Workers at IT firms are highly intelligent and properly equipped to handle stressful and high-pressure positions. These individuals are inventive, creative, and receptive to new ideas. The study's findings, which show that IT industry leaders have a high degree of openness to experience, totally corroborate the body of research in this area. The third key personality characteristic of CEOs in the IT business is agreeableness, which reflects their ability to operate well as a team and maintain empathy for their colleagues while holding back when expressing their own preferences and desires. According to the results of factor analysis, extraversion is not a particularly significant personality trait for CEOs in the IT sector. Extraverted individuals tend to be loud, chatty, and gregarious. Just 7.174% of the variance can be explained by this component. People with these qualities are inventive, creative, and receptive to new concepts. Resulting Conscientious people are focused on their goals, have long-term vision, andHigh conscientiousness individuals are focused on their goals, have long-term vision, and exhibit self-control. The findings here defy expectations; possible explanations include the fact that executives in the IT sector operate in constrained environments, which prevents them from thinking creatively and forces them to adhere to organizational boundaries and rules. As a result, these employees become submissive and rule-following.

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