Chapter 3
Methodology

The current study was conducted in four phases and with each phase objectives of the study were abided. In previous chapter, the first phase and the first objective were addressed i.e. conceptualizing the SRT Trait Model of Personality in Indian psychology. It involved an exhaustive study of the ancient literature and a process of ideation, identification and finalization of the traits to develop the model. The second objective and second phase included construction of the SRT-Trait scale of Personality in Indian psychology for empirical validation of the model. For this objective the following steps were implemented- item writing, item analysis, sampling and administration of the questionnaire and the exploratory factor analysis. From exploratory factor analysis, a cluster of traits and items were derived to form the final scale. This cluster of traits resulted in formation of a base model. In the third phase, the final scale was used to collect another set of data for confirmation of the base model. This was done by conducting confirmatory factor analysis i.e. structural equation modelling. In the fourth phase, the third and fourth objective of the research were fulfilled i.e. development of norms and preparing personality profiles according to professions and gender categories.

3.1. Phase one

The details about the development of the theoretical SRT-Trait model had been mentioned in Chapter 2. Operational definitions for the 19 traits were encoded in colloquial speech to prepare the items for SRT trait personality scale. The procedure is mentioned in the next section.

3.1.1 Item writing

A pool of items were prepared to tap the construct of each trait thoroughly. Each item was well-thought-out and written with simple and unambiguous words, easy syntax

and in statement format. This was necessary because poorly worded items introduce a potential source of error variance, reducing the strength of correlations among items and diminishing the overall objective of scale development (Worthington & Whittaker, 2006). The items were written taking cognitive and behavioural dimensions of each trait into context. Approximately seven to ten items were prepared for representing each trait. The English version of the draft was translated in Hindi and back translated by two language professionals. The scale had items in both Hindi and English language. Hindi was chosen as second language because of its wide usage over any native language. This gave a first draft of the SRT-trait scale with 159 items. It was then given to experts in the field of philosophy, psychology and Sanskrit for content validity as elaborated in next section.

3.1.2 Content validity of the inventory

Content validity is the measure of the legitimacy of items with respect to their content. The first draft of the SRT-trait scale was given to seven experts in the field for content validation. Of the seven experts, four experts had previously provided their guidance in the process of the identification and finalisation of the 19 traits. A brief introduction of these four experts is as follows – a) Ex-Vice Chancellor of The Maharaja Sayajirao University of Baroda, who has in-depth knowledge of Indian psychology; b) Retired Head of the Art History Department, The Maharaja Sayajirao University of Baroda who has a voluminous experience of teaching and research in Indian psychology; c) an Assistant Professor in the Department of Psychology, The Maharaja Sayajirao University of Baroda; d) practicing Ayurveda professional. Besides these four, two professors from the Department of Philosophy and one professor from Sanskrit Department of The Maharaja Sayajirao University of Baroda agreed to provide their guidance for validation. All seven experts were given the first

draft of the SRT-trait scale of personality with 159 items based on 19 traits, and their operational definitions (*see* Appendix C on page 169). Experts were asked to evaluate the items on following criteria-

1. To indicate whether the item was relevant and restricted to the operational definition of each trait, without any correspondence to other traits.

2. To indicate whether the item was clear in its communication with a least possibility of other interpretation.

Five out of seven experts suggested modification of fifteen items, elimination of seven items and accepted the remaining 137 items without any changes. Table 3.1(a) in Appendix D on page 185 had the list of items for modification and elimination. After deleting the seven items, modifying 15 items and adding 3 items (suggested by the experts), the scale consisted of 155 items. Table 3.1 (b) in Appendix D on page 186 contained the second draft of the SRT-trait scale of personality is attached. It was presented to the supervisor and experts for any further suggestions. After a week it was collected from them with an approval to use it for the data collection. The scoring pattern is mentioned in the following section.

3.1.3. Scoring pattern of the SRT-Trait Scale

The second draft of the SRT-Trait scale of personality had a five-point Likert scale scoring method. Each statement had five options as a response - Not at all, Little Bit, Sometimes, Most of the times and Always. The participants had to mark anyone of the responses according to the applicability of the item to their behaviour. The responses were coded as shown in Table 3.2. This coding does not imply any rank or order.

Table 3.2

Scoring pattern for Trait scale of personality

Not at all	1
Little bit	2
Sometimes	3
Most of the times	4
Always	5

This coding pattern was applicable to every item and there was no items with reverse scoring. The obtained scores were used for the item analysis (item discrimination and item-total correlation), exploratory factor analysis and reliability analysis. Details of these analyses are mentioned in section 3.3.

3.2. Phase Two

This phase includes the data collection for the exploratory factor analysis, the reliability of scores and the finalization of the scale for the confirmatory factor analysis.

3.2.1 Sample

The population within the age group 20-60 years and with graduation as the minimum educational qualification were targeted for drawing the sample. For a representative sample, data were collected from more than one city, i.e. Vadodara, Ankleshwar and Nagpur. The sample included the following professions- employees of private and government organizations, students pursuing higher education in different subjects, medical professionals, engineers, practitioners of law, administrative staff, clerks and

teaching professionals. A minimum of 500 participants were targeted for the sample, as it is the minimum recommended sample size for conducting a study on the general population (Gay, 2004). The permission letter duly signed by the Head of the Department of Psychology, The Maharaja Sayaji Rao University of Baroda, was obtained. The letter stated the purpose of the study, the sample size and an assurance to maintain confidentiality of data and use it for academic purposes only. Those organisations from Vadodara, Ankleshwar and Nagpur, which permitted the collection of data are listed below in Table 3.3.

Table 3.3

List of organisations

1.	Asian Paints Ltd., Ankleshwar
2.	Faculty of Arts, The Maharaja Sayajirao University of Baroda
3.	Faculty of Science, The Maharaja Sayajirao University of Baroda.
4.	*Gattu* Primary School, Ankleshwar
5.	Reliance Industries, Vadodara
6.	Persistence Pvt. Ltd., Nagpur
7.	Pioneer College of Physiotherapy, Vadodara.
8.	S.S.G. Hospital, Vadodara
9.	Sigma School of Engineering, Vadodara
10.	Sigma School of Physiotherapy, Vadodara
11.	Tikitar Industries, Vadodara
12.	Zenith School, Vadodara.
13.	Zydus Cipla, Ankleshwar

Note: EME School, Bright Day School and Sayajiganj police station in Vadodara did not grant any permission.

The data collected from above listed organisations was used for an exploratory factor analysis.

3.2.2 Data collection for the exploratory factor analyses

The participants were briefed about the research and their consent was taken. Then the questionnaires were handed to them. They had to fill in the demographic details before moving to the items. As per the instructions, participants had to read every item and check one of the options on the item's applicability to their behaviour. From Zenith School, Vadodara and Gattu School, Ankleshwar, 30 and 20 teachers respectively provided data. From Sigma School of Physiotherapy, Pioneer School of physiotherapy and SSG Hospital Medical College, 50 data sets were collected. From Sigma School of Engineering, Vadodara, 55 data sets were collected. From Tiki-Tar Industries and IPCL, Vadodara, 50 datasets were collected. From home-makers, 40 data sets and another 40 data sets were collected from software engineers of Persistent Pvt Ltd. Profession-wise distribution of data is presented below in Table 3.4.

Table 3.4

Sample distribution of 533 participants

Profession	No. of participants
Administrative professionals	125
Engineers	107
Home-makers	40
Medical professionals	88
Students	100

Teaching professionals	93
Total sample	553

Table 3.4 shows the sample distribution of 533 participants. Eighty-eight medical professionals included homeopathy practitioners, allopathic practitioners, nurses, resident doctors, physiotherapists and mental health professionals. A hundred and seven engineers included professional practitioner of engineering in the field of software, mechanical, electrical, electronic and civil. Ninety three teaching professionals included teachers of primary and secondary school and various departments of college and university. A hundred and twenty five administrative professionals consisted of administrative assistant, executive administrative assistant, secretary, clerk and front office manager. Forty home-makers included females who managed their household as a principal occupation. A hundred students consisted of students pursuing higher education in various disciplines. Of 533 participants, 203 were females and 330 were males. The dataset collected from above sample was coded and used to analyse the psychometric properties and exploratory factor analysis. The next section includes details about these properties.

3.2.3. Psychometric analysis

The initial psychometric analyses included the item analysis, where the item discrimination value and the item-total correlation were calculated. Items with appropriate item discriminative values and item total correlations were selected for Exploratory Factor Analysis (EFA) to determine latent factors. Lastly, a reliability coefficient of each factor was calculated by Cronbach Alpha. The sections ahead explain each of the above-mentioned analyses in detail.

3.2.3.1. Item analysis

Item analysis is a powerful technique available for establishing the adequacy of a scale and its items. It may greatly improve the effectiveness of the test items and the validity of test scores based on the item performance data for a newly constructed scale. Given below analyses include content validity, item difficulty and item validity (item discrimination).

For content validity, as mentioned in previous section the items were examined by experts. Item difficulty is an important factor because a high index indicates a difficult item and a low index indicates an easy item. This value is useful in ability tests but for personality inventories, item difficulty is not necessary (Sharma, 1990). Hence, item difficulty was not calculated. Item validity was assessed through ‘item discrimination'. Item discrimination refers to the ability of an item to differentiate among participants with high disposition and low disposition on the same trait. The method included here was to select the 25% participants with the highest scores and the 25% participants with the lowest scores on each trait with the help of Quartile Deviation (Sharma, 1990). Once these two groups were formed, a t-test was used to compute the significance of the mean difference between the high and low group for each item of all traits. Table 3.5 in Appendix E on page 198 shows the item discrimination values obtained for all 155 items. The significance threshold was set at .05. All 155 items in Table 3.5 have satisfying discriminant value. The interpretation of abbreviates in the table are as followed: S1 to S7 represent seven traits of *Sattva Guna*, R1 to R6 represent six traits *of Rajas Guna* and T1 to T6 represent six traits of *Tamas Guna*. Items were given a prefix with respect to their respective trait. For e.g. item S1.1 represents the first item (1) of the first trait of *Sattva Guna* (S1). These abbreviations are used in following tables too.

The item total correlation was performed to check inconsistency of any item in the trait and thus discard it. As mentioned earlier, this analysis helps in eliminating 'non-useful' items from the trait group, before they are subjected to the factor analysis. Items with item-total correlation values greater than 0.30 are appropriate (Nunnally & Bernstein, 1994; Traub, 1994; Vaus, 2002) and must remain in the scale. The item-total correlation was measure by Pearson's correlation between the scores of an item and its construct. Table 3.6 in Appendix E on page 205 shows the item-total correlation values. Table 3.6 shows that all items have acceptable item-total correlation value that is, more than 0.3 and they have positive correlation with their trait. For further analysis, they were subjected to the 'Exploratory factor analysis (EFA)'.

3.2.3.2 Exploratory Factor Analysis

Exploratory Factor Analysis is one of the categories of factor analyses. It is used to identify and confirm a smaller number of factors or latent constructs from a large number of observed variables (Worthington & Whittaker, 2006). The other category of factor analysis is the confirmatory factor analysis, which confirms the factor model extracted in an exploratory stage. EFA is commonly used by researchers during the scale development to cluster items into common factors and interpret the factors according to their item loadings (Bryman & Cramer, 1999). It helps with one of the core questions– how many factors or constructs underlie the set of items? Before moving ahead to the EFA, a few of its important concepts such as factors and loadings and their acceptable values must be understood. A factor is a collection of items that are grouped according to their high correlation among each other. Loading refers to the measure of association between an item and a factor (Bryman & Cramer 2005). It is also referred as item loading or factor loading. According to rules set by Kaiser

(1960), items with low (≤ 0.3) loading value and factors with low Eigenvalue (≤ 1) should be rejected to get a better factor. Unrelated items, those which do not belong together or do not define the construct, should be deleted (Munro, 2005). A cross loading item with a loading of 0.3 or more should be removed from the analysis (Tabachnick & Fidell 2001; Worthington & Whittaker, 2006).

According to Gerbing and Hamilton (1996), exploratory factor analysis methods like principal-axis and maximum-likelihood are able to discover a correct factor model satisfactorily. So, an EFA with principal axis factoring and oblique rotation was used to identify latent factors in accordance with the traits of theoretical model of the SRT-trait model in Indian psychology. EFA assesses the construct strength during the initial development of an instrument (Worthington & Whittaker, 2006) and identifies the misfit items of an intended factor. The data collected from 533 participants were subjected to exploratory factor analysis. Appropriate Eigenvalues of factors and loading values of items were criteria to eliminate misfit items. The first trial with Principal component analysis and oblique rotation method with Kaiser Normalization, resulted in 42 factors, clustering 155 items. The result of the initial analysis could not be accepted because few factors had single items and few items had close cross-loadings over more than two factors. Repetitive factorization resulted in the elimination of 77 misfit items. The remaining 78 items were distributed into 18 factors that is, eight traits of *sattva*, three traits of *rajas* and seven traits of *tamas*. This empirical structure was different from the theoretical structure of the SRT-Trait model as new factors evolved when few items of the *rajas guna* traits pooled in with the *sattva* trait and *tamas* trait. Table 3.7 in Appendix E on page 212 presented these 78 items with their traits. The internal consistency was found appropriate for only 7 factors out of 18. The rest of the 11 factors had low-reliability

values. With the reliability values and the reduction in a number of appropriate traits from 18 to seven, a redo of the factor analysis was done. Worthington and Whittaker (2006) had mentioned that the process of scale development using EFA is a relatively dynamic process of examination and revision followed by more examination and revision. Number of EFA were carried out with Maximum likelihood and Principle axis factoring (Gerbing & Hamilton, 1996), Promax (Worthington & Whittaker, 2006) with Kaiser Normalization and suppressed value of coefficient < 0.3. The items with cross-loadings or least contribution in the internal consistency were labelled as misfit items and deleted.

Gradually, 35 fit items distributed over 11 factors were retained with better factor solutions. Table 3.8 in Appendix E on page 216 shows these items for the final scale. Each factor had an appropriate Eigenvalue (>=1). Table 3.9 in Appendix E on page 218 presents the item loading of the 35 items distributed over 11 factors.

The EFA was started with 19 traits and 155 items. In the process, 120 items were found misfit and deleted, but a few items could unite themselves with items of different traits to form 11 factors. Given below are the 11 factors, with their item combinations, names and descriptions.

The first factor has items of *tamasic* habit, pessimism and *tamasic* knowledge. It describes the pessimistic outlook, faith in black magic to overcome problems and unhygienic habits. This factor is named '*Tamasic* Knowledge'.

The items of *sattvic* knowledge have spread across the second and fourth factor. The second factor consisted of few items of *sattvic* knowledge and few items of maturity. They imply the ability to understand and believe in supreme power. It is named '*Sattvic* Knowledge'.

The third factor contains items of *rajasic* knowledge, *tamasic* knowledge and immorality. They describe performing severe rituals and putting faith in Gods and demi-gods for acquiring materialistic gains, the fulfilment of wishes and easy money. This factor is named '*Rajasic* Habit'.

The fourth factor holds the remaining items of *sattvic* knowledge indicating an inclination towards spiritual knowledge for understanding the self, and improving thinking and living. It is renamed '*Sattvic* Spirituality' because items of *sattvic* knowledge merged with items of maturity to form the second factor.

The fifth factor contains items of *sattvic* habit, tranquillity and non-violence. They describe the capacity to control one's temper and maintain calmness. Hence, this factor is named 'Tranquillity'.

The sixth factor holds the remaining items of maturity trait (few merged with *sattvic* knowledge). They imply to be modest and not driven by materialistic desires like money, fame, awards and success. So this factor is named as 'Maturity'.

The seventh factor holds the remaining items of tranquillity and a reverse scored item of emotional fluctuation. Together, they describe a state of indifference and equanimity. As the fifth factor is already named tranquillity, this factor was given a new name – 'Emotional Stability'.

In the eighth factor, items of altruism and empathy are checked. They indicate being compassion towards people without having any personal connection with them and even with the deprived. This factor is named 'Empathy'.

The ninth factor contains items of *Sattvic* habit and a reverse scored item of *Tamasic* habit. They describe being considerate to one's physical health and having good organisation skills. This factor is named '*Sattvic* habit'.

The tenth factor contains items of lethargy and procrastination. They indicate having a sluggish and irresponsible behaviour. This factor is named '*Tamasic* habit'.

The 11th factor has items of passion and ambition. They indicate being zealous and busy. This factor is named 'Passion'.

Table 3.10 in Appendix E on page 220, shows the operational definition of 11 traits of the empirical SRT-trait model. Some of the items of the traits - maturity, composed, passion, lethargy, immorality and procrastination were removed from the SRT-Trait conceptual model, because they were found to be misfits in the empirical model. The reduction in the number of traits implies that a few traits are measurable only when combined with others. They have an independent theoretical identity but cannot be measured empirically. Each of the 11 traits explains behaviour, empirically stated as variance. Table 3.11 contains the variance, number of items and eigenvalue of each trait.

Table 3.11

Details about 11 traits

Sr. no.	Factor name	No. of items	Variance (in %)	Eigen value
1.	*Tamasic* Knowledge	7	13.141	4.599
2.	*Sattvic* Knowledge	4	23.133	3.497
3.	*Rajasic* Habit	5	30.026	2.412
4.	*Sattvic* Spirituality	4	35.300	1.846
5.	Tranquillity	3	39.895	1.608
6.	Maturity	2	44.237	1.520
7.	Emotional Stability	2	48.218	1.393

8.	Empathy	2	52.031	1.335
9.	*Sattvic* habit	2	55.592	1.246
10.	*Tamasic* habit	2	58.692	1.085
11.	Passion	2	61.682	1.047

Table 3.11 shows that all the 11 factors have Eigen values more than one and variance shared between the traits. The overall variance indicate that together, all the factors predict 61.68 % of behaviour.

3.2.3.3 Discriminant validity

According to Fornell and Bookstein (1982) discriminant validity is present when the variance shared between the construct and any other construct in the model is less than the variances that construct shares with its indicators. To measure the discriminant validity between the 11 factors, Pearson's correlation was used. Table 3.12 shows the variance shared between the 11 traits of SRT-Trait model.

Table 3.12

Variance shared between 11 traits

Factor	1	2	3	4	5	6	7	8	9	10	11
1	1										
2	-.223	1									
3	.186	.016	1								
4	.007	.403	.273	1							
5	-.271	.145	.124	.298	1						
6	-.060	.090	.010	.153	.227	1					

7	-.102	.003	.241	.150	.265	.051	1				
8	-.254	.302	.032	.280	.195	.144	.237	1			
9	-.019	.146	.024	.159	.111	.083	.149	.221	1		
10	.382	-.276	.160	.000	.021	.100	.030	-.121	.084	1	
11	.101	-.006	.122	-.008	.076	-.192	-.055	-.091	.047	.001	1

Table 3.12 indicates low correlational values between the traits, suggesting independence of each trait.

3.2.3.4 Reliability Analysis

Reliability refers to the ability of a questionnaire to consistently measure an attribute and to measure how well the items fit together, conceptually (Devon et al. 2007; Haladyna 1999). For a scale, the reliability refers to the extent to which the test is likely to produce consistent scores. The internal consistency method was used to examine the reliability of the complete SRT- Trait scale and each trait. Table 3.13 shows reliability for full scale and each of 11 traits.

Table 3.13

Reliability of 11 traits

Trait	Reliability (Cronbach Alpha)
1. *Tamasic* Knowledge	0.6
2. *Sattvic* Knowledge	0.8
3. *Rajasic* Habit	0.6
4. *Sattvic* Spirituality	0.8
5. Tranquil	0.7

6. Maturity	0.6
7. Emotional Stability	0.6
8. Empathy	0.6
9. *Sattvic* habit	0.6
10. *Tamasic* habit	0.6
11. Passion	0.6
Full scale	0.7

Table 3.13 shows the reliability of full Trait Scale and each factor measured by Cronbach alpha. The full scale reliability value is 0.7, indicating a good and consistent reliability of the items for a newly formed questionnaire (DeVellis 1991; Devon et al. 2007). The reliability of the 11 factors ranged from 0.6 to 0.8 indicating them to be good and reliable. This scale was finalized for the data collection from 1000 participants. The data so collected would be subjected to a confirmatory factor analysis to confirm the 11 factor model.

3.3. Phase three

A Confirmatory Factor Analysis (CFA) is performed to validate the empirical model evolved from EFA. Performing EFA and CFA in different data sets yields a generalizability of the model and conducting both EFA and CFA on the same data reduces such a possibility. Thus, the third phase includes data collection for Confirmatory Factor Analysis (CFA).

3.3.1. Data collection for Confirmatory factor analysis

The SRT trait scale with 35 items was used for collecting data and establishing norms. A sample of 1000 participants is considered excellent for a confirmatory factor

analysis (Comrey, 1973). As the sample size was larger than the first data collection (see section 3.2.1.), more organisations were approached. The characteristics of the population and procedure of administration of the scale remained similar to the initial data collection. In addition to the previously mentioned organisations (as in the first data collection), the data collection was extended to professional and educational organizations in Nagpur and Sagar (M.P.). Details of the organisations and the targeted population are mentioned in Table 3.14. A prior verbal consent from authority of organisations was taken to publish this list for academic use only.

Table 3.14

List of organisations for second data collection

	Name of organisation	Population
1.	Bank of Baroda, University campus branch, Vadodara.	Bank employees
2.	Centre for Advanced Studies and Department of Psychology in The Maharaja Sayajirao University of Baroda, Vadodara.	Research scholars
3.	Civil court and family court, Vadodara.	Lawyers
4.	Department of Chemistry, Criminology, Biology, Physics and Psychology, Hari Singh Gaur University in Sagaur, Madhya Pradesh.	Professors, lecturers, research scholars and students of Master programme
5.	Department of dermatology, obstetrics and gynaecology Sir Sayajirao Gaekwad (S.S.G.) Hospital, Vadodara.	Doctors
6.	Experimental school, The Maharaja Sayajirao university of Baroda, Vadodara.	Teachers and principal
7.	Four Nagar palika schools, Vadodara	Teachers and the Principal
8.	GUVNL, Vadodara.	The engineers, clerks and Administrative professionals
9.	Life Insurance Cooperation India Ltd, Vadodara	Administrative professionals

10.	MGVCL, Vadodara.	The engineers, clerks and Administrative professionals
11.	Persistent Pvt. Ltd., Nagpur	Software engineers and members of administrative staff
12.	Pioneer College of Physiotherapy, Vadodara.	Physiotherapists (practitioners and lecturers)
13.	Pioneer School of Homeopathy, Vadodara.	Homeopathy doctors and students in final year of masters
14.	Pioneer School of Nursing, Vadodara.	Nursing staff, students of Master's Program
15.	Sigma School of Bio-Chemistry, Vadodara.	Professors of college and the students of Master's Program
16.	Sigma School of Engineering, Vadodara.	Professors of college and the students of Master's Program
17.	Sigma School of Physiotherapy, Vadodara.	Physiotherapists (practitioners and lecturers)
18.	Tikitar Industries, Vadodara.	The members of administration, accounts and front office.

The authorities of every organisation mentioned in table 3.14, were approached with a permission letter for data collection authorized by Department of Psychology, The M.S. University of Baroda. The letter included the purpose of

research, sample size and confidentiality rule. After receiving verbal and written consent from the authorities of organisation and participants, a suitable date was fixed with them for collection of data. The consent form is attached in Appendix C on page 183.

The employees of MGVCL and GUVNCL have a common building, functioning from different floors and cubicles. Amongst them, 250 engineers, 200 members of the administrative staff and 30 members of the clerical staff were given the SRT-trait scale. On the next day, 110 engineers, 100 members of the administrative staff and 30 members of the clerical staff returned the questionnaire. A day later, 90 engineers and 50 members of the administrative staff returned the questionnaire, and remaining 50 engineers and 50 members of the administrative staff had misplaced their questionnaires. From the total data collected from MGVCL and GUVNL, 12 data sets of the engineers, 100 of administrative staff and 20 of clerical staff were discarded, because they left 20-30 items unanswered. The final number of usable data was 188 from the engineers, 50 from the administrative staff and 10 from the clerical staff of MGVCL and GUVNL.

Authorities of Shikshan Samiti, Govindrao Madhyavati shala, Vadodara were approached with an application to allow the data collection from teachers of Nagar Nigam Palika (government school), Vadodara. After a week, the permission was granted for three schools in Fatehganj and one school in the Nizampura area. Each school had the same number of staff members - ten teachers, one headmistress, one or two members of the clerical staff and one or two peons. All the teachers and the principal were informed about the research and the scale was handed to them. After a couple of days, the same were collected back. Similarly, Principals (Gujarati medium and English medium) of the Experimental School, The Maharaja Sayajirao University

of Baroda were approached and within a couple of days, the data from 20 teachers were collected. In total a data set of 60 teachers were collected and coded.

Fifteen research scholars of the Faculty of Education and Psychology, The Maharaja Sayajirao University of Baroda agreed to participate and requested a soft copy of the scale. Within a day, the data was received from all.

Fifty Administrative professionals of the Life Insurance Cooperation of India, agreed to participate as subjects in the research. In a day's time, they returned the scale with all items attended to. One of the officers requested a soft copy, so the data was collected through email from him.

Lawyers in Nyaya Mandir i.e. session court and family court of Vadodara were approached. Of the lawyers present, 90 agreed to participate. Three lawyers requested for a soft copy of the scale and a personality analysis report. It took two to four days, to distribute and collect the scale. Including the soft copies, 82 were usable and 8 were discarded for the same reasons as mentioned above.

Data from 120 students of the master program and 50 medical professionals were collected from the Homeopathy, Nursing and Physiotherapy School of Pioneer College. Data of 30 physiotherapists were collected from the Sigma College of Physiotherapy and 50 of professors of Engineering School of Pioneer College were collected.

From the Physics, Biology and Chemistry departments of the Hari Singh Gaur University, Sagar, M.P., data sets of 50 professors and 50 research scholars were collected. Further, from Sociology, Criminology and Forensic Science departments, data sets from 40 professors, 20 research scholars and 110 students of the master programme were collected. The total data collected was- 90 professors, 70 research

scholars and 110 master's students. Out of this total, 25 data sets of research scholars were discarded for the same reasons as mentioned above.

From Persistent Pvt. Ltd., Nagpur, data from 100 computer engineers and 3 members of the administrative staff were collected in soft copy format.

In the S.S.G. Hospital, Vadodara, three doctors and two resident doctors of dermatology and five resident doctors of obstetrics and gynaecology agreed to participate. Due to time constraint, none of them was able to attend to the scale.

Another 23 data sets were collected from home-makers, 21 from psychologists. The latter was included in medical professionals group due to the proximity of professions.

It took nearly, eight to nine months to collect data from 1018 participants. Table 3.15 shows the number of people in each profession.

Table 3.15

Sample distribution of 1018 participants

S. No.	Groups	Total no. of Participants
1.	Administrative professionals	257
2.	Engineers	107
3.	Home-makers	22
4.	Lawyer	96
5.	Medical professionals	101
6.	Self- employed	42
7.	Students	229

8.	Teaching professionals	164
	Total	1018

Table 3.15 shows the sample distribution of 1018 participants. A hundred and one medical professionals include homeopathy practitioners, allopathic practitioners, nurses, resident doctors, physiotherapists and mental health professionals. A hundred and sixty four teaching professional include teachers of primary and secondary school and various departments of college and university. A hundred and seven engineers include professional practitioners of engineering in the field of software, mechanical, electrical, electronic and civil. Ninety six lawyers include practitioners of law such as advocates and public notaries. Two hundred and twenty nine students consist of students pursuing higher education in different disciplines. Two hundred and fifty seven administrative professionals consist of administrative assistants, executive administrative assistants, secretaries, clerks and front office managers. Twenty two home-makers include females who managed their household. Forty two self-employed people include freelance artists, entrepreneur and businessmen. The number of males and females in total sample is 539 and 479 respectively. The data set of 1018 participants was subjected to Structural Equation Modelling to check the goodness of fit for the empirical SRT-trait model with 11 traits and to establish norms for the SRT-trait scale. The fourth phase details the procedure for this.

3.4 Phase four

This phase includes Structural Equation Modelling as a tool for the Confirmatory Factor Analysis to check the model fitness indices of the 11-factor model that emerged in the EFA. Descriptive information of the fit indices is mentioned along.

3.4.1. Structural Equation Modelling and Confirmatory Factor Analysis

Worthington and Whittaker (2006) stated that the CFA is most commonly used for the validation of a scale following an EFA. Structural Equation Modelling (SEM) is a tool used widely for CFA. SEM gives an empirical base to models within the social and behavioural sciences (Martens, 2005; Martens & Hasse, 2006; Quintana & Maxwell, 1999; Weston & Gore, 2006). Arbuckle (2006) has stated that Structural equation modelling (SEM) is most commonly thought of as a hybrid between a regression and some form of factor analysis. It allows one to perform some type of multilevel regression on factors. However, the primary goal of SEM is to determine and validate a proposed causal model. Therefore, SEM is a confirmatory technique (Raykov, 2005). For SEM, two main goals are set. First, to understand the patterns of correlation/covariance among a set of variables, and second, to explain as much of their variance as possible with the model specified (Kline, 2010). In typical SEM, the factor structure obtained in the EFA undergoes a confirmatory procedure to obtain a good fit of the model, and to support the factor structure reliability and validity of the scale. Another approach is to compare competing for theoretically plausible models (e.g., different numbers of factors, inclusion or exclusion of specific paths); in other words, the factor structure uncovered in the EFA can be compared with alternative models to evaluate which model fits the data best (Worthington & Whittaker, 2006). Due to the absence of any *Triguna* Trait model of personality in Indian psychology, such an attempt was not possible for current study. The 11-trait model formulated in the EFA was tested for its model fitness in SEM with 1018 data sets.

The statistical theory underlying SEM assumes that large sample sizes are necessary to provide stable parameter estimates (Bentler, 1995). The minimum sample size for SEM is 100 (Worthington & Whittaker, 2006).

Conducting Structural Equation Modelling (SEM):

Schumacker and Lomax (1996) have suggested that SEM shall begin with (1) reviewing the relevant theory and research to support the model and preparing a structure of the model in form of a diagram or equations; (2) collecting data and conducting preliminary descriptive statistical analyses for estimating parameters in the model; (3) assessing model fit indices; (4) defining the meaning of the model and (5) finally, interpreting the model fit indices. The first two suggestions were met as mentioned in the previous sections. For the rest of the suggestions, the 11factors as formulated in the EFA were subjected to SEM for CFA. Figure 3.1 explains the resulting structure, in which 'rectangles' represent observed variables and 'ovals' represent latent variables. Every observed variable has an error linked to it to measure its error variance. To analyse the fitness of the 11-trait model, a dataset of 1018 participants were used. Figure 3.1 shows the representation of the 11-trait model.

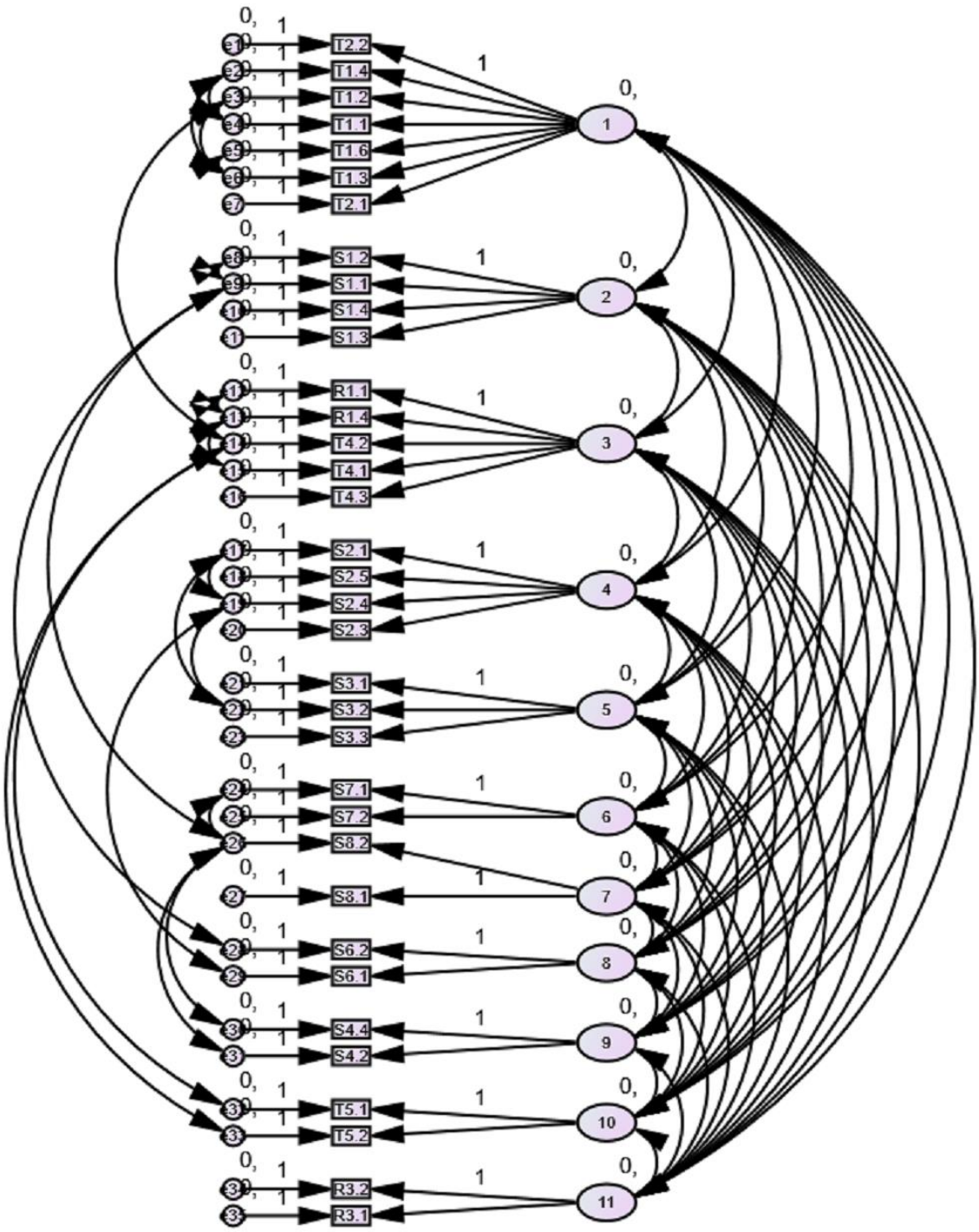

Figure 3.1. The empirical 11- factor model

The structure of model formulated in EFA contains the 11 traits which were conceptualized as unobserved factors and items which were conceptualized as

observed factors. Model fit indices were classified as incremental, absolute, predictive or parsimonious fit indices (Kline, 2005).

Absolute fit indices measures the ability of a structural equation model in explaining the relationships, found in the sample data. The absolute fit index contains Discrepancy Chi-Square, Root Mean Square of Error Approximation (RMSEA) and Goodness Fit Index (GFI), and their acceptable values are $p>0.05$ (Wheaton, Muthen, Alein & Summers, 1977), $RMSEA<0.08$ (Browne & Cudeck, 1993) and $GFI>0.90$ (Joreskog & Sorbom, 1984) respectively.

Incremental fit indices measures the improvement in a model's fit to the data by comparing a specific structural equation model to a baseline structural equation model. The typical baseline comparison model is the null (or independence) model in which all the variables are independent of each other or uncorrelated (Bentler & Bonnett, 1980). The incremental fit index contains the adjusted goodness of fit (AGFI), comparative fit index (CFI), Tucker-Lewis index (TLI) and normed fit index (NFI). Their acceptable values are $AGFI > 0.90$ (Tanaka & Huba, 1985), $CFI > 0.90$ (Bentler, 1990), $TLI > 0.90$ (Bentler & Bonett, 1980) and $NFI > 0.90$ (Bollen, 1989).

Predictive fit indices or parsimony fit measures the fitness of structural equation model in other samples from the same population through Chi sq/df value. It must be less than 5 to be acceptable (Marsh & Hocevar, 1985).

It is highly recommended to use these three fit measures by including one index for each category for determining the model fit (Hair, 2010; Holmes-Smith, 2006).

Table 3.16 gives a summary of the model fit indices for the SRT-trait model of personality along with the acceptable standards.

Table 3.16

The model fit indices for SRT-trait model of personality

Fit measure	Index	Literature	Acceptance level	Acceptable standard	SRT-trait model
Absolute fit	Discrepancy Chi Square-Chi sq	Wheaton, Muthen, Alein and Summers (1977)	P > 0.05	Sensitive to sample size > 200	1048.460 at p=0.000
	RMSEA-Root Mean Square of Error Approximation	Browne and Cudeck (1993)	RMSEA < 0.08	Range 0.05 to 0.10 acceptable	0.034
Incremental fit	CFI Comparative Fit Index	Bentler (1990)	CFI > 0.90	CFI = 0.95 is a good fit	0.91
	TLI - Tucker-lewis Index	Bentler and Bonett (1980)	TLI > 0.90	TLI = 0.95 is a good fit	0.9
Parsimonious fit	Chisq/df- Chi Square/Degrees of Freedom	Marsh and Hocevar (1985)	Chi sq/df < 5.0	The value should be below 5.0	2.160

Table 3.16 shows the model fit indices for the empirical SRT-Trait model. The indices in all the three categories are in accordance with the acceptable standards. According to Hipp and Bollen (2003), if the model has 'good' fit indices then the power to detect discrepancies from predictions are amplified. The chi-square test statistic is used to test the overall model fit in SEM (Worthington & Whittaker, 2006), and according to Kline (2005) findings reported in SEM consist of (a) the chi-square test statistic with corresponding degrees of freedom and level of significance, (b) the RMSEA (Steiger & Lind, 1980) with its corresponding 90% confidence interval, and (c) the Comparative Fit Index (CFI; Bentler, 1990). Other alternative fit indices that evaluate model fit could also be considered.