

**CUSTOMER ENGAGEMENT, SATISFACTION AND
CHURN: A STUDY OF INDIAN TELECOM SECTOR**

Thesis Submitted For the Award of the Degree of

DOCTOR OF PHILOSOPHY

in

Management

By

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I, Uday Arun Bhale, declare that this thesis has been prepared solely by myself and that it has not been submitted, in whole or in part, in any previous application for a degree. Except where states otherwise by reference or acknowledgement, the work presented is entirely my own.

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CERTIFICATE

TO WHOM IT MAY CONCERN

I certify that Uday Arun Bhale has prepared his thesis entitled “Customer Engagement, Satisfaction and Churn: A Study of Indian Telecom Sector” for the award of PhD degree at the Lovely Professional University, under my guidance. He has carried out the work at the Department of Management, Lovely Professional University.

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1. TABLE OF CONTENTS

Sr no	Particulars	Page no
1	Table of Content	iv
2	List of Tables	v
3	List of Figures	ix
4	List of Abbreviation	xii
5	List of Appendices	xv

CHAPTER I: INTRODUCTION

1.1	Introduction	1
1.2	Global Scenario of Telecom Sector	2
1.3	Overview of the Indian telecom sector	5
1.3.1	Indian Telecom Evolution	5
1.3.2	4G VOLTE Technology	7
1.3.3	Predatory Pricing Formula	7
1.3.4	Interconnect Usage (IUC) Charges	7
1.3.5	The Financial Stress on Mobile Companies	8
1.3.6	Mobile Number Portability (MNP) Seventh Amendment	8
1.3.7	Supreme Court Verdict Adjusted Gross Revenue (AGR)	9
1.4	Shifts in Customer Behavior	10
1.4.1	Single sim vs multi sim Customer	10
1.4.2	Data Usage	13
1.5	Customer Churn	13
1.5.1	Customer Churn Types	13
1.5.2	Churn Control Management Process	14
1.5.2.1	Proactive Retention	15
1.5.2.2	Reactive Retention	15
1.6	Customer Engagement, Satisfaction and Churn	15
1.7	Motivation to Study	16
1.8	Objectives of the Study	17
1.9	Significance of the Study	17

CHAPTER II: REVIEW OF LITERATURE

2.1	Introduction	19
2.1.1	Bibliometric Analysis	19
2.2	Customer Engagement	20
2.2.1	Bibliometric Analysis and Literature Review of Customer Engagement	20
2.2.1.1	Year-wise Analysis of Customer Engagement	20
2.2.1.2	Country-wise Analysis of Customer Engagement	21
2.2.1.3	Author-wise Analysis of Customer Engagement	21
2.2.1.4	Subject-area Analysis of Customer Engagement	22
2.2.1.5	Keyword-wise Analysis of Customer Engagement	23
2.2.1.6	Source-wise Analysis of Customer Engagement	24
2.2.1.7	Journal-wise Analysis of Customer Engagement	25
2.2.1.8	Article –wise Analysis of Customer Engagement	25
2.2.2	Conceptualization: Customer Engagement	28
2.2.3	Customer Engagement Service Channels in Telecom	31
2.3	Customer Satisfaction	38
2.3.1	Bibliometric Analysis and Literature Review	38
2.3.1.1	Year-wise Analysis of Customer Satisfaction	39
2.3.1.2	Country-wise Analysis of Customer Satisfaction	39
2.3.1.3	Author wise Analysis of Customer Satisfaction	40
2.3.1.4	Subject-area Analysis of Customer Satisfaction	41
2.3.1.5	Keyword-wise Analysis of Customer Satisfaction	41
2.3.1.6	Source-wise Analysis of Customer Satisfaction	43
2.3.1.7	Journal-wise Analysis of Customer Satisfaction	44
2.3.2	Conceptualization: Customer Satisfaction	46
2.3.3	Significance of Customer Satisfaction	48
2.3.4	Factors Influencing Satisfaction in Telecom Sector	50
2.4	Association of Customer Demographic Profile With Customer Engagement and Satisfaction	53
2.5	Customer Churn	55
2.5.1	Bibliometric Analysis and Literature Review of Customer Churn	55
2.5.1.1	Year-wise Analysis of Customer Churn	55
2.5.1.2	Country-wise Analysis of Customer Churn	56

2.5.1.3	Author wise Analysis of Customer Churn	57
2.5.1.4	Subject-area Analysis of Customer Churn	57
2.5.1.5	Keyword-wise Analysis of Customer Churn	58
2.5.1.6	Source-wise Analysis of Customer Churn	59
2.5.1.7	Journal-wise Analysis of Customer Churn	60
2.5.2	Conceptualization: Customer Churn	63
2.5.3	Factors Influencing Churn in Telecom	64
2.6	Customer Engagements, Satisfaction, and Churn	69
2.7	Research Gap	70
2.8	Proposed Contribution of the Study	71

CHAPTER III: RESEARCH METHODOLOGY

3.1	Research Design	73
3.1.1	Research Topic	73
3.1.2	Research Objectives	73
3.1.3	Hypotheses	73
3.1.4	Conceptual Model	74
3.1.5	Scope of Study	74
3.2	Variables and Measures	74
3.2.1	Construct Specification	75
3.2.1.1	Customer Engagement (CE)	75
3.2.1.2	Customer Satisfaction	75
3.2.1.3	Customer Churn	75
3.2.2	Generation of Item Pool and Selection of Sample of Items	75
3.2.2.1	Operationalization of Customer Engagement Construct	76
3.2.2.1.1	Attributes of Customer Engagement	76
3.2.2.2	Operationalization of Customer Satisfaction Construct	77
3.2.2.2.1	Attributes of Customer Satisfaction	78
3.2.2.3	Operationalization of Customer Churn Construct	81
3.2.2.3.1	Attributes of Customer Churn	81
3.2.3	Scaling	83
3.2.4	Content Validation and Testing	84
3.3	Sample Design	89
3.3.1	Sampling	89

3.3.2	Sample Size	90
3.3.3	Sample Profile	93
3.3.4	Sampling Method	95
3.4	Data Analysis Techniques	96
3.5	Limitations	97

CHAPTER IV: MEASUREMENT, VALIDITY AND ANALYSIS

4.1	Sample Characteristics	98
4.2	Descriptive Statistics	99
4.2.1	Normality Test	99
4.2.1.1	Normality Test of Customer Engagement Construct	100
4.2.1.2	Normality Test of Customer Satisfaction Construct	100
4.2.1.3	Normality Test for Customer Churn Construct	102
4.3	Measurement	102
4.3.1	Reliability	104
4.3.2	Validity	105
4.3.3	Evaluating of Fitness: Measurement Model	105
4.4	Process of Analysis	106
4.4.1	Factor Analysis	107
4.4.1.1	Exploratory Factor Analysis	107
4.4.1.1.1	Steps in Exploratory Factor Analysis	107
4.4.1.2	Confirmatory Factor Analysis (CFA)	108
4.4.2	Structural Equation Modelling	109
4.5	Exploratory Factor Analysis (EFA) and Confirmatory Factor (CFA): Engagement, Satisfaction and Churn	109
4.5.1	Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) For Customer Engagement Constructs	109
4.5.1.1	Exploratory Factor Analysis of Customer Engagement Constructs	110
4.5.1.1.1	Explanation of the Factors Derived for Customer Engagement	111
4.5.1.1.2	Statistical Significance of the Factor Analysis	112
4.5.1.2	Confirmatory Factor Analysis of Customer Engagement Constructs	113
4.5.1.2.1	Measurement and Validation of Customer Engagement Construct	113
4.5.1.2.1.1	Measurement and Validation of Human-Based Customer Engagement Scale	113

4.5.1.2.1.2	Measurement and Validation of Machine-Based Customer Engagement Scale	115
4.5.1.3	Dimensionality of Customer Engagement	116
4.5.1.3.1	Measurement and Validation of Customer Engagement (Multi-Dimensional)	116
4.5.1.3.2	Measurement and Validation of Customer Engagement (Uni-dimensional)	120
4.5.2	Exploratory Factor Analysis (EFA) And Confirmatory Factor (CFA) Analysis for Customer Satisfaction Constructs	122
4.5.2.1	Exploratory Factor Analysis of Customer Satisfaction Constructs	122
4.5.2.1.1	Explanation of the Factors Derived for Customer Satisfaction	125
4.5.2.1.2	Statistical Significance of the Factor Analysis	126
4.5.2.2	Confirmatory Factor Analysis of Customer Satisfaction Constructs	127
4.5.2.2.1	Measurement and Validation of Customer Satisfaction Construct	127
4.5.2.2.2	Measurement and Validation of Network Scale	127
4.5.2.2.3	Measurement and Validation of Value Scale	128
4.5.2.2.4	Measurement and Validation of Customer Delight Scale	128
4.5.2.2.5	Measurement and Validation of Experience Scale	129
4.5.2.2.6	Measurement and Validation of Care Scale	130
4.5.2.3	Dimensionality of Customer Satisfaction	132
4.5.2.3.1	Measurement and Validation of Customer Satisfaction (Multi-dimensional)	133
4.5.2.3.2	Measurement and Validation of Customer Satisfaction (Uni-dimensional)	136
4.5.3	Exploratory Factor Analysis (EFA) and Confirmatory Factor (CFA) Analysis for Customer Churn Constructs	140
4.5.3.1	Exploratory Factor Analysis of Customer Churn Constructs	140
4.5.3.1.1	Explanation of the Factors Derived for Customer Churn	142
4.5.3.1.2	Statistical Significance of the Factor Analysis	143
4.5.3.2	Confirmatory Factor Analysis of Customer Churn Constructs	143
4.5.3.2.1	Measurement and Validation of Customer Churn Constructs	143

4.5.3.2.2	Measurement and Validation of Network Quality Scale	144
4.5.3.2.3	Measurement and Validation of Service Scale	144
4.5.3.2.4	Measurement and Validation of Product Value Scale	145
4.5.3.2.5	Measurement and Validation of Social Influence Scale	146
4.5.3.2.6	Measurement and Validation of Advertisement Scale	146
4.5.3.2.7	Measurement and Validation of Brand Scale	147
4.5.3.3	Measurement and Validation of Customer Churn	148

CHAPTER V: ASSOCIATION OF CUSTOMER ENGAGEMENT AND SATISFACTION WITH CUSTOMER DEMOGRAPHICS

5.1	Customer Engagement (Uni-dimensional) and Customer Demographics	153
5.2	Customer Engagement (Multi-dimensional) and Customer Demographics	154
5.3	Customer Satisfaction (Uni-dimensional) and Customer Demographics	157
5.4	Customer Satisfaction (Multi-dimensional) and Customer Demographics	159
5.5	Conclusion	164

CHAPTER VI: CUSTOMER ENGAGEMENT AND SATISFACTION RELATIONSHIP

6.1	Customer Engagement and Satisfaction Relationship	166
6.2	Models of Customer Engagement and Satisfaction Relationship	167
6.2.1	Model 1: Customer Engagement (Uni- dimensional) →Satisfaction (Uni- dimensional)	168
6.2.1.1	Measurement Model of Customer Engagement (Uni- dimensional) →Satisfaction (Uni- dimensional)	168
6.2.1.2	Structural Model of Customer Engagement (Uni- dimensional) →Satisfaction (Uni- dimensional)	171
6.2.2	Model 2: Customer Engagement (Multi-Dimensional) and Satisfaction Model (Uni- dimensional)	175
6.2.2.1	Measurement Model of Customer Engagement (Multi-Dimensional) and Satisfaction Model (Uni- dimensional)	175
6.2.2.2	Structural Model of Customer Engagement (Multi-Dimensional) and Satisfaction Model (Uni- dimensional)	179
6.2.3	Model 3: Customer Engagement (Uni- dimensional) → Satisfaction (Multi- dimensional)	182

6.2.3.1	Measurement Model of Customer Engagement (Uni- dimensional) → Satisfaction (Multi- dimensional)	182
6.2.3.2	Structural Model of Customer Engagement (Uni- dimensional) → Satisfaction (Multi- dimensional)	186
6.2.4	Model 4: Customer Engagement (Multi-dimensional) and Satisfaction (Multi- dimensional)	189
6.2.4.1	Measurement Model of Customer Engagement (Multi-dimensional) and Satisfaction (Multi- dimensional)	189
6.2.4.2	Structural Model of Customer Engagement (Multi-dimensional) and Satisfaction (Multi- dimensional)	193
6.3	Result and Discussion	196

CHAPTER VII: FINDINGS, RECOMMENDATIONS IMPLICATIONS AND LIMITATIONS

7.1	Findings and discussion	199
7.2	Recommendations	207
7.3	Conclusion and Implications	209
7.4	Limitation and Future Scope	212

BIBLIOGRAPHY 213

APPENDICES 267

1.	Questionnaire	267
2.	Awards	273
3.	Copyrights	274
4.	Industry Assistance Letter	275
5.	Industry Feedback on Research	276

LIST OF PUBLICATION 277

LIST OF CONFERENCE ATTENDED 279

LIST OF THE WORKSHOPS ATTENDED 281

2. LIST OF TABLES

- 1.1: Countries with Smartphone Subscribers (2020)
- 2.1: Top Five Authors (publication-wise) and Citation on Customer Engagement
- 2.2: Frequently Used Keywords in the Customer Engagement Literature
- 2.3: Source Wise Publications on Customer Engagement
- 2.4: Most Cited Documents on Customer Engagement Construct
- 2.5: Parameters for the Measurement of Customer Engagement
- 2.6: Top Five Authors (Publication-Wise) On Customer Satisfaction Construct
- 2.7: Frequently Used Keywords in the Customer Satisfaction Literature
- 2.8: Source Wise Publications on Customer Satisfaction
- 2.9: Top Cited Documents on Customer Satisfaction Construct
- 2.11: Top Five Authors (Publication-Wise) on Customer Churn Construct
- 2.12: Frequently Used Keywords in the Customer Churn
- 2.13: Source Type Document on Customer Churn Construct
- 2.14: Top Documents (In Terms of a Number of Citations) On Customer Churn Construct
- 3.1: Items for Measuring Customer Engagement
- 3.2: Items for Measuring Customer Satisfaction
- 3.3: Items for Measuring Customer Churn
- 3.4: Items Selected for Measuring Engagement
- 3.5: Items Selected for Measuring Customer Satisfaction
- 3.6: Items Selected for Measuring Customer Churn
- 3.7: Sample Size In Factor Analysis
- 3.8: Mobile Subscribers as on 30th April 2020
- 3.9: Actual Contribution of Mobile Subscribers and Proposed Sample Size
- 3.10: Proposed Sample Size Distribution Across Geography
- 4.1(a): Sample Characteristics Operator Wise
- 4.1(b): Sample Characteristics Male and Female
- 4.2: Assessment of Normality for Customer Engagement Construct
- 4.3: Assessment of Normality for Customer Satisfaction Construct
- 4.4: Assessment of Normality for Customer Churn Construct
- 4.5: Criteria for Reliability Coefficient
- 4.6: Model Fit Indices and Literature Support
- 4.7: Model Fit Indices Interpretation
- 4.8: Initial Eigenvalues Customer Engagement Constructs

- 4.9: Total Variance Explained Customer Engagement Constructs
- 4.10: Rotated Component Matrix of Customer Engagement Constructs
- 4.11: Reliability Test Customer Engagement
- 4.12: Standardized Factor Loadings and Residuals for Human-Based Customer Engagement Scale
- 4.13: Modified indices for Human-Based Customer Engagement Scale
- 4.14: Revised Standardized Residual Covariances for Human-Based Customer Engagement
- 4.15: Standardized Factor Loadings and Residuals for Machine-Based Customer Engagement
- 4.16: Standardized Residuals for Customer Engagement (Multi-dimensional) Construct
- 4.17: Standardized Residuals of Customer Engagement (Multi-dimensional) for Revised Model
- 4.18: Discriminant Validity Analysis for Customer Engagement (Multi-dimensional) Model
- 4.19: CFA Report for Customer Engagement (Multi-dimensional) Construct
- 4.20: Summary of Engagement (Multi-dimensional) Construct Model Fit Indices
- 4.21: Standardized Residuals for Customer Engagement (Uni-dimensional) Construct
- 4.22: CFA Report for Customer Engagement (Uni-dimensional) Construct
- 4.23: Summary of Engagement (Uni-dimensional) Construct Model Fit Indices
- 4.24: Initial Eigenvalues Customer Satisfaction Constructs
- 4.25: Total Variance Explained Customer Satisfaction Constructs
- 4.26: Rotated Component Matrix of Customer Satisfaction Constructs
- 4.27: Reliability Test for Customer Satisfaction Construct
- 4.28: Standardized Factor Loadings and Residuals for Network Scale
- 4.29: Standardized Factor Loadings and Residuals for Value Scale
- 4.30: Standardized Factor Loadings and Residuals Customer Delight Scale
- 4.31: Standardized Factor Loading and Residual for Experience Scale
- 4.32: Modification Indices of Care Scale
- 4.33: Revised Standardized Factor Loadings and Residuals for Care Scale
- 4.34: The CFA Report of Customer Satisfaction Construct
- 4.35: Summary of Satisfaction Construct Model Fit Indices
- 4.36: Standardized Residual Covariances Customer Satisfaction (Multi-dimensional)
- 4.37: Discriminant Validity Analysis of Customer Satisfaction (Multi-dimensional) Constructs
- 4.38: Standardized Residual Covariances Customer Satisfaction (Uni-dimensional)
- 4.39: The CFA Report of Customer Satisfaction (Uni-dimensional) Construct
- 4.40: Summary of Satisfaction (Uni-dimensional) Construct Model Fit Indices

- 4.41: Initial Eigenvalues Customer Churn Constructs
- 4.42: Total Variance Explained Customer Churn Construct
- 4.43: Rotated Component Matrix of Customer Churn Constructs
- 4.44: Reliability Test for Customer Churn Construct
- 4.45: Standardized Residual Covariances for Network Quality Scale
- 4.46: Standardized Residual Covariances for Service scale
- 4.47: Standardized Residual Covariances for Product Value Scale
- 4.48: Standardized Residual Covariances for Social Influence Scale
- 4.49: Standardized Residual Covariances for Advertisement Scale
- 4.50: Standardized Residual Covariances for Brand Scale
- 4.51: Summary of Churn Construct Model Fit Indices
- 4.52: Standardized Residual Covariances Customer Churn
- 4.53: Discriminant Validity Analysis of Customer Churn Construct
- 5.1: Categorization of summated score Customer Engagement (Uni-dimensional)
- 5.2: Association between Customer Demographics and Degree of Customer Engagement (Uni-dimensional)
- 5.3: Categorization of a summated score of Customer Engagement (Multi-dimensional)
- 5.4(a): Association between Customer Demographics and Engagement (Multi-dimensional) human-based customer engagement
- 5.4 (b): Association between Customer Demographics and Customer Engagement (Multi-dimensional) machine-based customer engagement
- 5.5: Categorization of Summated Score Customer Satisfaction (Uni-dimensional)
- 5.6: Association between Customer Demographics and Degree of Customer Satisfaction (Uni-dimensional)
- 5.7: Categorization of a Summated Score of Customer Satisfaction (multi-dimensional)
- 5.8(a): Association between Customer Demographics and Customer Satisfaction (Multi-dimensional), Network
- 5.8(b): Association between Customer Demographics and Customer Satisfaction (Multi-dimensional), value
- 5.8(c): Association between Customer Demographics and Customer Satisfaction (Multi-dimensional), care
- 5.8(d): Association between Customer Demographics and Customer Satisfaction (Multi-dimensional), experience
- 5.8 (e): Association between Customer Demographics and Customer Satisfaction (Multi-

dimensional), delight

- 6.1: Standardized Residuals of Measurement Model for Customer Engagement (Uni-dimensional) and Customer Satisfaction (Uni-dimensional)
- 6.2: Psychometric Properties of the Measurement Model for Customer Engagement (Uni-dimensional) and Satisfaction (Uni-dimensional)
- 6.3: Model Fit Indices and Path coefficients of Customer Engagement (Uni-dimensional) and Satisfaction (Uni-dimensional)
- 6.4: Psychometric Properties of The Measurement Model for Customer Engagement (Multi-dimensional) and Satisfaction (Uni-dimensional)
- 6.5: Standardized Residuals of Measurement Model for Engagement (Multi-dimensional) and Satisfaction (Uni-dimensional)
- 6.6: Model Fit Indices and Path coefficients of Customer Engagement (Multidimensional) and Satisfaction (Uni-dimensional)
- 6.7: Standardized Residual Covariances of Engagement (Multi-dimensional) and Satisfaction (Multi-dimensional)
- 6.8: Psychometric Properties of the Measurement Model for Customer Engagement (Multi-dimensional) and Satisfaction (Multi-dimensional)
- 6.9: Model Fit Indices and Path coefficients of Customer Engagement (Multi-dimensional) and Satisfaction (Multi-dimensional)
- 6.10: Standardized Residual Covariances of Engagement (Uni-dimensional) and Satisfaction (Multi-dimensional)
- 6.11: Psychometric Properties of the Measurement Model for Customer Engagement (Uni-dimensional) and Customer Satisfaction (Multi-dimensional)
- 6.12: Model Fit Indices and Path coefficients of Customer Engagement (Uni-dimensional) and Satisfaction (Multi-dimensional)
- 6.13: Model Fit Indices for the Structural Models
- 7.1: Demographic Association
- 7.2: Customer Engagement and Satisfaction Model

3. LIST OF FIGURES

- 1.1: Indian Mobile Industry
- 1.2: Global Smart Phone Users
- 1.3: Indian Telecom Revolution
- 1.4: MNP Seventh Amendment
- 1.5: Tele-density in India
- 1.6: Multi-SIM by Handset type (%), source: Nielsen
- 1.7: Multi-SIM Incident in India (%), source: Nielsen
- 1.8: Monthly UPC Generation Trend in India (in Millions)
- 2.1: Year-Wise Trend in Published Documents on Customer Engagement Construct
- 2.2:Country-Wise Trend In Published Documents On Customer Engagement Construct
- 2.3:Subject-Area Wise Trend In Published Documents On Customer Engagement Construct
- 2.4: Wordcloud Diagram: Customer Engagement Keyword
- 2.5: Source Wise Publications on Customer Engagement
- 2.6: Top Journals (In Terms of a Number of Publications) on Customer Engagement
- 2.7: Customer Engagement and Satisfaction Level of Service Channels
- 2.8: Customer Contact Volume for Service Channels
- 2.9: Customer's Preferred Mode of Engagement with Service Provider by Breuer et al., 2020
- 2.10: Year-Wise Trend in Published Documents on Customer Satisfaction Construct
- 2.11:Country-Wise Trend In Published Documents On Customer Satisfaction Construct
- 2.12 :Subject-Area Wise Trend In Published Documents On Customer Satisfaction Construct
- 2.13: Wordcloud Diagram: Customer Satisfaction Keyword
- 2.14: Source Wise Publications on Customer Satisfaction
- 2.15: Top Journals (In Terms of a Number of Publications) On Customer Satisfaction Construct
- 2.16: Year-Wise Trend in Published Documents on Customer Churn Construct
- 2.17 :Country-Wise Trend In Published Documents On Customer Churn Construct
- 2.18 :Subject-Area Wise Trend In Published Documents On Customer Churn Construct
- 2.19: Word cloud Diagram: Customer Churn Keyword
- 2.20: Source Wise Publications on Customer Churn Construct
- 2.21: Top Journals (In Terms of a Number of Publications) On Customer Churn Construct
- 3.1: Conceptual Model
- 3.2: Sample Size Table
- 3.3: Summary of Research Methodology

- 4.1: Scree Plot of Customer Engagement Constructs
- 4.2: CFA Model for Human-Based Customer Engagement Scale
- 4.3: Revised CFA Model for Human-Based Customer Engagement Scale
- 4.4: CFA Model for Machine Based Customer Engagement Scale
- 4.5: CFA Model for Customer Engagement (Multi-dimensional) Construct
- 4.6: Revised CFA Model for Customer Engagement (Multi-dimensional) Construct
- 4.7: CFA Model for Customer Engagement (Uni-dimensional) Construct
- 4.8: Scree Plot of Customer Satisfaction Constructs
- 4.9: CFA Model for Network Scale
- 4.10: CFA Model for Value Scale
- 4.11: CFA Model for Delight Scale
- 4.12: CFA Model for Experience Scale
- 4.13: CFA Model for Care Scale
- 4.14: Revised CFA Model for Care Scale
- 4.15: CFA model for Customer Satisfaction (Multi-dimensional) construct
- 4.16: CFA model for Customer Satisfaction (Uni Dimensional) construct
- 4.17: Scree Plot of Customer Churn Constructs
- 4.18: CFA Model for Network Quality Scale
- 4.19: CFA Model for Service Scale
- 4.20: CFA Model for Product Value Scale
- 4.21: CFA Model for Social Influence Scale
- 4.22: CFA Model for Advertisement scale
- 4.23: CFA Model for Brand Scale
- 4.24: CFA for Customer Churn Construct
- 6.1 Measurement Model for Engagement (Uni-dimensional) and Satisfaction (Uni-dimensional)
- 6.2 Structural Model for Engagement (Uni-dimensional) and Satisfaction (Uni-dimensional)
- 6.3 Measurement Model for Engagement (Multi-dimensional) and Satisfaction (Uni-dimensional)
- 6.4 Structure Model for Engagement (Multi-dimensional) and Satisfaction (Uni-dimensional)
- 6.5: Measurement Model for Engagement (Multi-dimensional) and Satisfaction (Multi-dimensional)
- 6.6: The Structural Model Engagement (Multi-dimensional) and Satisfaction (Multi-dimensional)

6.7 Measurement Model for Customer Engagement (Un- Dimensional) and Satisfaction
(Multi-dimensional)

6.8 Structural Model for Customer Engagement (Un- Dimensional) and Satisfaction (Multi-
dimensional)

4. LIST OF ABBREVIATIONS

Sr no	Abbreviation	Description
1	1 G	First generation of wireless cellular technology
2	2G	Second generation mobile network.
3	3G	Third generation mobile network.
4	4G	Fourth generation mobile network.
5	5G	Fifth generation mobile network.
6	AGFI	Adjusted Goodness-Of-Fit Index
7	AGR	Adjusted Gross Revenue
8	ARPU	Average Revenue Per User
9	AT&T	American Telephone & Telegraph Company
10	AVE	Average Variance Extracted
11	BSNL	Bharat Sanchar Nigam Limited
12	CAGR	Compound annual growth rate
13	CDMA	Code-division multiple access
14	CDMA	Code Division Multiple Access
15	CE	Customer Engagement
16	CFA	Confirmatory Factor Analysis
17	CFI	Comparative Fit Index
18	Chisq/df	Chi-square divided by the degrees of freedom or Minimum Discrepancy Per Degree of Freedom
19	CMIN/DF	Minimum Discrepancy Per Degree of Freedom
20	COAI	Cellular Operators Association of India
21	COCO	Company owned company operated
22	CPM	Churn propensity model
23	CR	Composite Reliability
24	CS	Customer Satisfaction
25	DHT	Direct-to-home
26	DOT	Department of Telecommunications
27	EFA	Exploratory Factor Analysis
28	EVDO	Evolution-Data Optimized
29	FAQ's	Frequently Asked Questions
30	FOCO	Franchisee owned company operated

31	GB	Gigabyte
32	GDP	Gross domestic products
33	GFI	Goodness-Of-Fit Index
34	GPS	Global Positioning System
35	GSM	Global System for Mobile communications
36	HD	High Definition
37	IUC	Interconnect usage
38	IVR	Interactive Voice Response
39	KYC	Know Your Customer
40	MCH	Mobile number portability clearing house
41	MNP	Mobile number portability
42	MNP	Mobile Number Portability
43	MSV	Maximum Shared Squared Variance
44	MTNL	Mahanagar Telephone Nigam Limited
45	NFI	Normed Fit Index
46	NPS	Net promoter score
47	OTP	One Time Password
48	OTT	Over the Top
49	PClose	p of Close Fit
50	RCOM	Reliance Communications Limited
51	RMSEA	Root Mean Square Error of Approximation
52	SEM	Structural equation modeling
53	SIM	Subscriber Identification Module
54	SMS	Short Message Service
55	SMT	Significant Market Power in Telecommunications:
56	SPSS	Statistical Package for the Social Sciences
57	SRMR	Standardized Root Mean Square Residual
58	TD-LTE	Time Division Duplexing-Long Term Evolution
59	TDSAT	Telecom Disputes Settlement and Appellate Tribunal
60	TLI	Tucker-Lewis index
61	TRAI	Telecom Regulatory Authority of India
62	UPC	Unique porting code
63	USSD	Unstructured supplementary service data
64	VAS	Value Added Services

5. LIST OF APPENDICES

	Lists	Page number
1.	Questionnaire	267
2.	Awards	273
3.	Copyright	274
4.	Industry Assistance Letter	275
5.	Industry Feedback on Research	276

PREFACE

The purpose of this thesis is to study customer engagement, satisfaction and churn in Indian telecommunication.

Chapter I introduces the Indian telecom business, changes in customer behaviour in Indian telecom, and a brief introduction to customer engagement, satisfaction and churn. Chapter II presents a bibliometric review of the Scopus database and a review of literature on customer engagement, satisfaction and churn construct along with the research gaps. Chapter III has been written on the research methodology. It contains the research design and provides steps and flow for the development of the research questionnaire, sample profile, determination of sample size, data analysis tools, techniques and limitations of the study. Chapter IV describes the measurement, validation of different constructs and factor analysis part. In the first section, customer engagement analysis is examined for EFA and CFA followed by uni and multi-dimensional view, the second section consists of the examination of EFA and CFA for customer satisfaction constructs followed by a uni and multi-dimensional view. The third section constructs EFA and CFA analysis for customer churn constructs. Chapter V presents the association of demographics on customer engagement and satisfaction constructs with the Chi-square test. The relationship between customer engagement and satisfaction is studied in Chapter VI with four different models. Chapter VII consists of findings, and recommendations followed by implication and limitation sections.

ABSTRACT

Customer behaviour in the Indian telecom sector is going under turbulence mode. A study by Nokia (2021), shows that the average monthly mobile internet usage of Indian customers has gone up 13.5 Gb as of 31st December 2020 and is expected to continue to increase up to fourfold by 2025. In a similar line, the study by Nielsen (2019) on Indian mobile customer behaviour, reveals the usage of smartphones is on an increasing trend and is primarily driven by cheaper mobile tariff plans and dual sim smartphones. It is notable that India's smartphone penetration is on an increasing trend with 31.80 per cent in the year 2020 and Indian teledensity is at 85.78 per cent in the year 2020. This change in customer behaviour provides an opportunity to study the Indian telecom sector.

Customer engagement and satisfaction play a very critical role in any company's success, as per the study by McKinsey (2017) the customer engagement pattern is changing from traditional engagement to digital engagement modes and the level of customer satisfaction in digital engagement is higher than the traditional engagement. Digital engagement gives more stability, and scalability but despite all these advantages, digital customer engagement is low.

The data of mobile number portability (MNP) requests reveals that India's mobile number portability requests were at 5 million (average of Jun'19, Jul'19 and Aug 19), which shows customer's intention to move from the existing mobile service provider. Customer churn results in a high financial loss to the mobile service providers as the cost of acquiring a new customer is quite high. Joshi (2014) has revealed that a 5 per cent churn reduction can lead to a 20-25 per cent increase in profitability for the company.

Research by Strohmaier and colleagues (2019) shows that a change in technology and /or the socio-economic status of the people of an economy generally leads to a change in customer behaviour and consequently affects customer satisfaction and churn behaviour.

The Telecom sector in India has come a long way, as per the Telecom Regulatory Authority of India (TRAI) report published in November 2019; India has more than 1175 million mobile subscribers. India is the world's second-largest telecommunications market in the financial year 2019. The Indian telecom sector has transformed from a voice-driven market to a data-driven market.

The transformation of the Indian telecom sector creates an acute need to reassess the degree of customer satisfaction, and the tools required to engage customers and identify the reasons for customer churn.

Research Objectives:

The following objectives have been considered for the current study

- To identify the various attributes of customer engagement.
- To study the various determinants of customer satisfaction and their relative importance.
- To assess the association of customer demographic with customer engagement and customer satisfaction.
- To study the relationship between customer engagement and customer satisfaction.
- To assess the relevance of various parameters in describing customer churn.

RESEARCH METHODOLOGY

A descriptive research design has been adopted for the current study. A personal survey has been designed to assess the attributes of customer engagement, determinants of customer satisfaction and parameters of customer churn. The purposive sample of 1600 respondents (400 each from north, east, south and west has been taken to describe Indian telecom consumers). It has been ensured that all sample from four operators has been taken in proportion with the customer market share.

Exploratory factor analysis and confirmatory factor analysis has been applied for the conduct of the study to identify the attributes of customer engagement. The psychometric properties of Customer engagement has been accessed through AVE, Cronbach alpha.

Exploratory factor analysis and confirmatory factor analysis has been applied has been accessed to factor structure and measurement validity of customer satisfaction constructs.

The association of customer demographics with customer engagement and satisfaction has been accessed through the chi-square test. The attributes such as gender, age, education and occupation has been taken to define customer demographics.

The relationship between Customer Engagement and Customer Satisfaction has been accessed through the structural equation model. Four unique models describing Customer engagement and Customer Satisfaction has been conceptualised and tested for their model fit and explained variance.

The parameters of customer churn has been examined by applying exploratory factor analysis and confirmatory factor analysis.

FINDINGS

The study presents a call centre, multibrand outlet, retailer, written letter, franchisee store, company store, mobile app, SMS, webchat, interactive voice response, third party app, emails, and websites as important channels of customer engagement. It is interesting to note that the attributes identified in the study can be clubbed into two major factors i.e., Human-based customer engagement and Machine-based customer engagement.

The study acknowledges the validity of uni-dimensional as well as multi-dimensional conceptualization of customer engagement construct. Under multi-dimensional conceptualization of customer engagement, Human-based customer engagement and Machine-based customer engagement distinctively impacts various other attributes of customer behaviour such as customer satisfaction.

Customer satisfaction is one of the most crucial parameters for the success of any business. In the context of the Indian telecom sector, attributes like voice coverage, call drop, video buffering/streaming experience, online gaming experience, mobile network data coverage, voice quality, network busy or call congestion, SMS service, over-the-top (OTT), communication, product tariff, value-added services (VAS), goodwill gesture, promise fulfilment, customer engagement activity, new technology products, new product information, documentation process, service consistency, solving customer issues, response, first time right, billing accuracy, delight are been defined as the major attributes of customer satisfaction.

The present study attempts to employ factor analysis and aggregate the various attributes into five factors that define customer satisfaction. The factor analysis reveals factors determining customer satisfaction are network, value, care, experience and delight.

As far as the dimensionality of customer satisfaction is concerned, to conduct of the present study acknowledges the uni-dimensional or multi-dimensional conceptualization of the customer satisfaction construct. It is important to note that both, the uni-dimensional or multi-dimensional conceptualization of customer satisfaction construct have a sound theoretical base hence it is the purpose of the research which affects the choice of uni-dimensional or multi-dimensional conceptualization of customer satisfaction.

The present study considers gender, age, education and occupation of the customer as major attributes of customer demographic and attempts to study the association of these attributes with customer engagement and customer satisfaction through the Chi-square test.

The result of the study reveals a significant association of gender with customer engagement and satisfaction. The association of gender with customer engagement and

satisfaction has meaningful implications for the industry it might be possible that the need and usage of female customers in the telecom sector differ from the male customers and that might be the reason for the significant association of gender with customer engagement and satisfaction. The mobile operator while describing a strategy for customer engagement and satisfaction must consider gender as an important factor.

The result of the study reveals that age plays a significant role in machine-based customer engagement and satisfaction (uni and multi-dimensional model). The association of age with machine-based customer engagement and satisfaction has important implications for the telecom industry it might be possible that the understanding or learning of machine-based customer engagement channels of customers may differ with the age bracket of the Indian telecom customers and that might be the reason for the significant association of the age with the machine-based customer engagement. On the other side customer needs and requirements may vary as per customer age bracket resulting in a significant association of network, value, care, experience and delight factors on customer satisfaction. It is interesting to note that age is not playing a significant role in the human-based customer engagement channel, this might be because of the maturity of the telecom industry in India.

The result of the Chi-square test for the association of educational qualification of the customer with customer engagement and customer satisfaction reveals that education plays a significant role while defining customer engagement and satisfaction (uni-dimensional model). The association of education with machine-based customer engagement and human-based customer engagement has important implications for the telecom industry, it might be possible that the language preference/constrain or learning of machine-based customer engagement channels of customers may differ across the education level of Indian telecom customers and that might be a reason for the significant association of the education with the machine-based customer engagement as well as human-based customer engagement. On the other side, customer needs and requirements may vary as per customer educational qualification resulting in a significant association of education with customer satisfaction. It is notable that education is not significantly associated with the network, value, care, experience and delight.

The result of the study reveals that occupation plays a significant role while defining customer engagement and satisfaction (uni-dimensional model). The association of occupation with machine-based customer engagement and satisfaction has important implications for the telecom industry, it might be possible that the needs and requirements of the service class and business class vary and needs different kinds of engagement strategies.

What satisfies a consumer from the business class may not be relevant for a consumer from the service class.

The relationship between customer engagement and satisfaction has been assessed by conceptualizing four different models of customer engagement and satisfaction relationships.

These models are described below:

Model 1: Customer Engagement (Uni- dimensional) → Satisfaction (Uni- dimensional)

Model 2: Customer Engagement (Multi- dimensional) → Satisfaction (Uni- dimensional)

Model 3: Customer Engagement (Uni- dimensional) → Satisfaction (Multi- dimensional)

Model 4: Customer Engagement (Multi- dimensional) → Satisfaction (Multi- dimensional)

The detailed result of the study on these models is described as

Model 1: The result of the structural model on Customer Engagement (Uni- dimensional) → Satisfaction (Uni- dimensional) reveals a significant effect of customer engagement on customer satisfaction.

Model 2: The result of the structural model on Customer Engagement (Multi- dimensional) → Satisfaction (Uni- dimensional) shows a significant effect of customer engagement (multi- dimensional) on customer satisfaction (Uni- dimensional).

The study on the factor Human-based Customer Engagement → Satisfaction and Machine-based Customer Engagement → Satisfaction shows a significant effect of customer engagement (Multi-dimensional) on customer satisfaction (Uni- dimensional).

Model 3: The result of the structural model on Customer Engagement (Uni-dimensional) → Satisfaction (Multi-dimensional) shows the significant effect of customer engagement on value, experience, care, delight and network (customer satisfaction factors).

Model 4: The result of the structural model on Customer Engagement (Multi-dimensional) → Satisfaction (Multi-dimensional) shows the significant effect of human-based customer engagement and machine-based customer engagement (customer engagement factors) on value, experience, care, delight and network (customer satisfaction factors).

The present study describes customer churn. Churn is referred to as a customer leaving a certain product in the company and moving to another product for the same company (Joshi, 2012). The study presents network quality, service, product value, social influence, advertisement, and brand as key attributes for customer churn.

IMPLICATIONS

The findings of the present study can be used by cellular service providers while formulating their customer engagement, satisfaction and churn management strategies. The findings of this research convey a strong message to service providers that customer engagement is an important link between the service provider and the customer.

A manager must understand that human and machine-based customer engagement is a very important factor in achieving customer satisfaction. Hence managers must focus on the service levels of various customer engagements channel to ensure quality.

The present study defines network, value, care, experience and delight as important attributes of customer satisfaction. The findings implies that the queries of customers must be handled with care and experience. The study also suggests that companies must invest a sufficient amount in network services to deliver the best-in-class network experience to customers.

The structural models of customer engagement-satisfaction relations highlight a significant impact of customer engagement on customer satisfaction. The demographic study on customer engagement and satisfaction can be used by the manager to do the re-segmentation of the customer. The demographic study on gender, age bracket, education and occupation can help to improve the customer engagement and satisfaction KPI.

The analyses of the churn construct show that network quality, service, product value, social influence, advertisement, and brand are the inflecting factors for customer churn.

During analysis of factors describing customer churn network quality is coming as the most important factor which is similar to characteristics of network factors of the customer satisfaction constructs, hence the mobile service provider needs to look at the network quality parameters closely (Chadha & Bhandari,2014; Gamulin *et al.*,2015).

The study can be used by academicians to enhance the contribution of the customer engagement, satisfaction and churn constructs. The study can be used by the various social and government bodies to develop policies on telecommunication like the quality-of-service policy which is based on the customer pain points/ satisfaction requirement as this study gives the reason for customer satisfaction and churn.

LIMITATION AND FUTURE SCOPE

This study shows the relationship between customer engagement and customer satisfaction construct and factors affecting customer churn. In near-future relationships can be studied between customer engagement, satisfaction and churn constructs.

In this study the demographic effect on customer engagement and satisfaction construct studied with gender, age, education and occupation, the study can be further extended to other demographics like income group, rural/urban etc.

The present study shows the customer engagement, satisfaction and churn construct basis on the attributes which were collected from the primary data collection procedure from the mobile users, in the near future the study can be concluded on these constructs with the attributes which are in secondary data nature like average revenue per user, complaints, data usage, voice usage etc. and can be done with the cluster analysis like operator wise analysis.

This study was limited to the prepaid telecom industry, a similar kind of study can be extended to other service industries like DTH, broadband etc. and also can be studied for the post-paid or enterprise segment of customers.

CONCLUSION AND RECOMMENDATIONS

The study reveals that human-based customer engagement and machine-based customer engagement are the two important factors of customer engagement.

Human-based customer engagement is a critical element of customer engagement for Indian mobile customers as this is the only source of engagement with the mobile service provider for non-data (internet) users. India still contributes about 50 per cent of the customers with basic/feature phones hence their primary source of engagement with the service provider is human-based customer engagement only. Machine-based customer engagement is equally critical because of changing scenario of the Indian telecom sector where a lot of emphasis has been given to digitization.

The findings on the customer engagement and satisfaction factors and related studies on demographic association have provided insights that can be used by the industry while deciding their customer or product segmentation strategy.

Network and network quality are the most critical factors while deciding customer satisfaction and churn. From broader perspective companies need to provide good network services to improve customer satisfaction and reduce churn rate. Value is another critical element for customer satisfaction and churn respectively, companies will surely lose the customer base and satisfaction level if they failed to provide value to customers (Chakraborty & Sengupta, 2014).

Based on the analysis and interpretation of data, in the previous chapters, the study comes out with the following recommendations

1. Human-based customer engagement and Machine- based customer engagement are integral parts of the customer engagement construct. The managerial personnel involved in the Indian Telecom sector need to pay equal emphasis on both i.e. Human-based and Machine- based channels of customer engagement.
2. The parameters such as network, value, care, experience and delight define the Customer satisfaction construct in the context of the Indian Telecom sector.
3. Customer satisfaction is one of the crucial parameters for the success of service providers in the Indian Telecom sector.
4. The need and usage of female customers in the telecom sector differ from those of male customers. The mobile operator while describing a strategy for customer engagement and satisfaction must consider gender as an important factor.
5. The age of respondents has no significant association with Human-based customer engagement channels. The service personnel deployed over various touchpoints need to consider people from all age groups with equal care and attention.
6. The age of respondents has a significant association with Machine-based customer engagement channels. The learning ability of customers of different age groups may differ and hence this needs to be considered by the service providers while describing their customer engagement strategy.
7. The age of respondents has a significant association with customer satisfaction. The service providers can initiate different measures to satisfy their customers of different age groups.
8. The education of respondents has a significant association with customer engagement as well as with customer satisfaction. The customer's needs and requirements may vary as per their educational level. The machine-based engagement initiatives may be more not work for respondents who have no formal education. The human-based engagement initiatives may be more suitable to satisfy this set of customers.
9. The occupation of respondents has a significant association with customer engagement as well as with customer satisfaction. What satisfies a consumer from the business class may not be relevant for a consumer from the service class. Telecom companies must consider the occupation criteria of their customer while designing their customer engagement strategy for human-based and machine-based customer engagement service channels, on the other side companies need to focus on the occupation of the customer as an important factor while making a strategy for customer satisfaction.

10. Customer engagement is a significant determinant of customer satisfaction. Though the results reveal the higher importance of human-based engagement channels viz-a-viz of machine-based engagement initiatives. But the importance of machine-based customer engagement cannot be underestimated.
11. Human-based customer engagement is a critical element of customer engagement for Indian mobile customers as this is the only source of engagement with the mobile service provider for non-data (internet) users.
12. Machine-based customer engagement is equally critical because of changing scenario of the Indian telecom sector where a lot of emphases have been given to digitization.
13. The study proposes network quality, service, product value, social influence, advertisement, and brand as key attributes of customer churn.
14. Network quality has emerged as the most significant reason for customer churn. The telecom operators must emphasize data speed, network coverage and quality of voice call to retain their customers.

CHAPTER -I

INTRODUCTION TO THE PROPOSED RESEARCH WORK

1.1 INTRODUCTION

The telecommunication industry plays an important role in the development of any economy. It connects people and businesses at a very faster pace and ensures the transmission of important information at lightning speed. Digitization is one of the key components of the growth of the telecommunication Industry. During the digitisation process data transmission from the data source to the data processing unit is done with the help of telecommunication.

Oxford dictionary defines digitalisation as “the translation of script, images, or voice into a digital form that a Centralized Processing Unit can handle”. To have successful digitalisation in any country, data transmission plays a vital role. With the introduction of the smartphone, high data speed mobile network and affordability of mobile internet services, mobile telecommunication have become a critical pillar of digitalisation. The telecom industry plays an important role that giving end-mile connectivity to the user.

The Telecom sector in India has come a long way, as per the Telecom Regulatory Authority of India (TRAI) report published in November 2019; India has more than 1175 million mobile subscribers. India is the world's second-largest telecommunications market in the financial year 2019. The Indian telecom sector has seen disruptive customer behaviour in the recent past by shifting its customers to data users from voice users. Data consumption in India has shown exponential growth from the year 2016, as per the TRAI wireless data services report of the year 2019, the average data consumption of data has gone up from 4.13 Gb to 7.69 Gb per month for wireless data customers during the period 2017 to 2018, and it's still continuously growing.

In the telecom industry, for the resolution of service issues or any request/inquiry customer engages with the service channel (Digital and Non-Digital) which is called customer engagement and based on the satisfaction level with the service channel, the customer decides the decision on switching the mobile services. Hence customer engagement and satisfaction play a critical role in customer churn in the telecom industry. Because of digitalisation, engagement with service channels is changing from non-digital to digital resulting in a change in defining customer satisfaction and churn management processes.

India has one of the highest telecom subscriber churn rate in the world with 6.5 % (year 2012), said that monthly 4.68 million (August 2019) unique porting code (UPC) generated by Indian customers is an indicator of subscribers want to move from one mobile

operator to another operator. Details on the monthly unique porting requests and wireless mobile base movement of the industry can be seen in Figure no. 01.

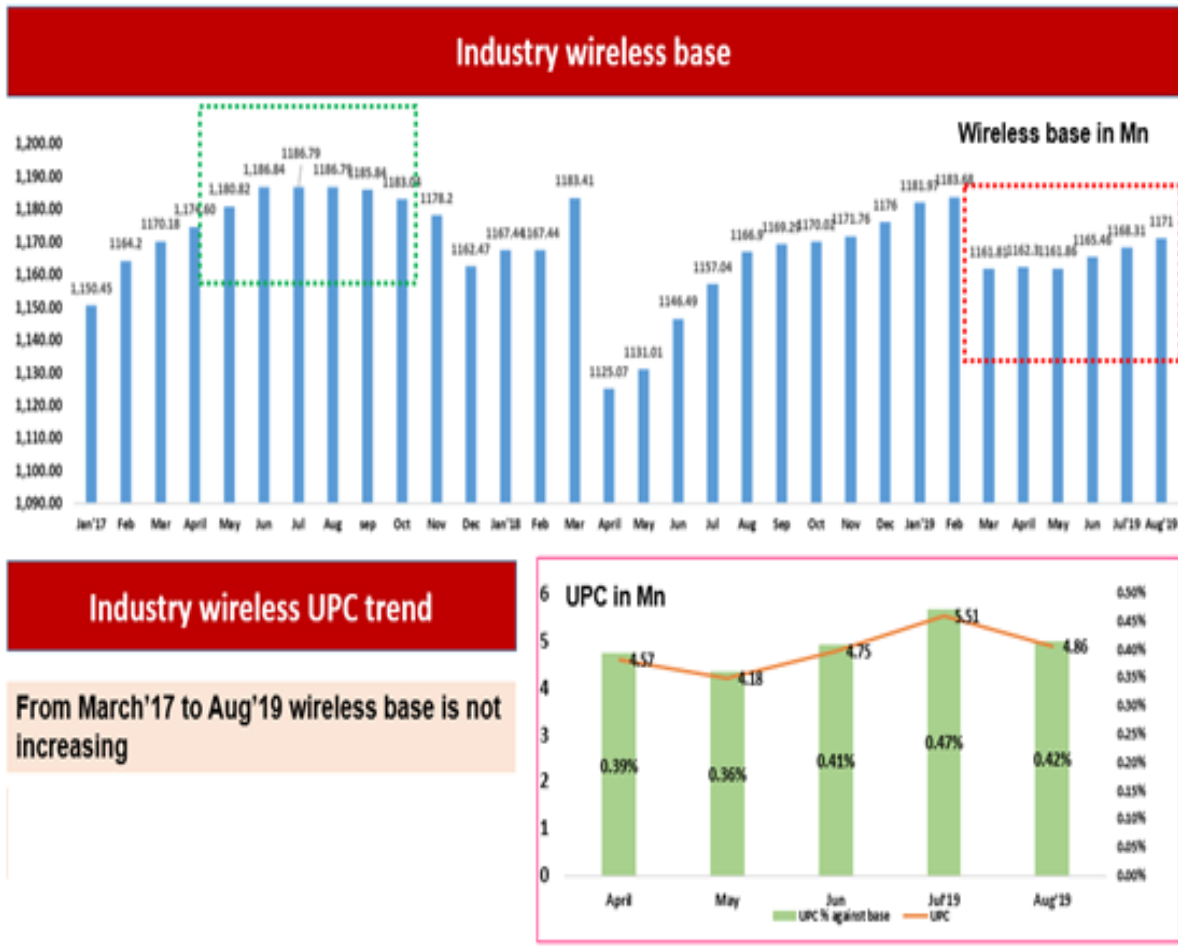


Figure no. 1.1: Indian Mobile Industry
Source: Telecom Regulatory Authority of India (TRAI)

This thesis provides insights on customer engagement, satisfaction and churn in the telecom industry.

1.2 GLOBAL SCENARIO OF TELECOM SECTOR

The Global Telecom industry has grown at a CAGR of 9.1 % over the period from 2012 to 2019. The key factor contributing to market growth is the demand for data. Globally mobile network works on different technologies which are 2G/3G/4G and 5G, countries like Singapore, and South Korea has closed down their 3G & 2G services and moved to only 4G network services in the year 2018, while in United States, mobile service provider AT&T has decided to shut down their 3G services in the year 2018 to become a 4G only operator. This shows that countries are moving to 4G technologies by moving away from 2G/3G

technologies. In the year 2019, 5G testing was done in Abu Dhabi and London by Huawei and Vodafone, countries like Japan, and South Korea is trying for 5G testing and global revenues from 5G services in the telecom industry are projected to increase to 23.95 billion USD in the year 2025 and going to be a vital driver of the growth.

Smartphone plays a vital role in the telecom industry, as per Wikipedia smartphone is defined as a “mobile phone that performs multiple functions of a computer, generally with a touchscreen interface, Internet access, and an operating system capable of running downloaded apps”.

Global smartphone user count is showing exponential growth and it is projected to reach 6378 million by the year 2021 end (Figure no. 1.2), this is resulting in more customers using a smartphone and looking for higher data usage and better data experience (Statista, 2020).

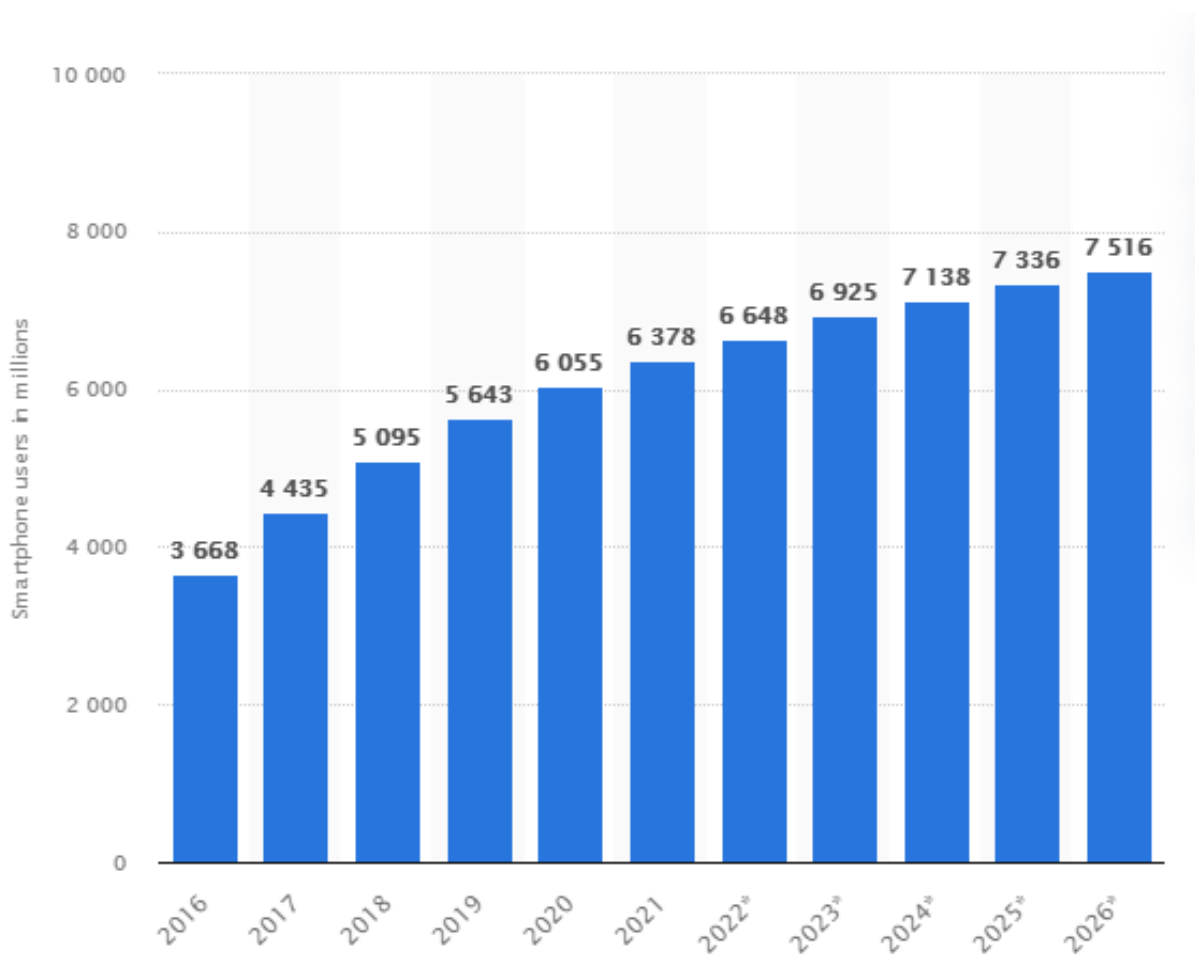


Figure no. 1.2: Global Smart Phone Users

Source: <https://www.statista.com/statistics/330695/number-of-smartphone-users-worldwide/>

Table no. 1.1: Countries with Smartphone Subscribers (2020)

Sr no	Country/Region	Total population (Million)	Smartphone penetration	Smartphone users(Million)
1	Bangladesh	164.69	32.40%	53.3
2	Brazil	212.56	51.40%	109.34
3	China	1440	63.40%	911.92
4	France	65.27	77.60%	50.66
5	Germany	83.78	77.90%	65.24
6	India	1380	31.80%	439.42
7	Indonesia	273.52	58.60%	160.23
8	Iran	83.99	62.90%	52.81
9	Italy	60.46	75.90%	45.92
10	Japan	126.48	59.90%	75.77
11	Mexico	128.93	54.40%	70.14
12	Pakistan	220.89	18.40%	40.59
13	Philippines	109.58	37.70%	41.31
14	Russia	145.93	68.50%	99.93
15	South Korea	51.27	76.50%	39.2
16	Thailand	69.8	54.30%	37.88
17	Turkey	84.34	61.70%	52.06
18	United Kingdom	67.89	78.90%	53.58
19	United States	331	81.60%	270
20	Vietnam	97.34	63.10%	61.37

Source: Wikipedia

(https://en.wikipedia.org/wiki/List_of_countries_by_smartphone_penetration#2020_rankings)

Rapid transformation with new technologies like 4G, the affordable smartphone, has restructured the global telecom sector. The introduction of 5G will further accelerate the changes in telecom mobile customer's lifecycle in near future (Wikipedia, 2021).

1.3 OVERVIEW OF THE INDIAN TELECOM SECTOR

The economic survey presented for the year 2018 -2019 in the union budget of India states that 32 million jobs are directly or indirectly dependent on the telecom industry, adding to this; foreign direct investment in the telecom industry for FY19 has gone up to \$ 2.6 billion, double from \$ 1.3 billion in FY16 (ET Bureau, 2019). In the year 2020 after covid19 pandemic further proves the importance of the telecom industry, during that period telecom industry contributed 30-35% of the GDP of the service sector (Kawoosa,2020).

After 2016 the Indian telecom sector is consolidated into four telecom players as Vodafone Idea Ltd, Reliance Jio, Airtel, and BSNL, focusing on expanding the 4G network and aggressive offering data benefits.

1.3.1 Indian Telecom Evolution

The British East India Company introduced the telegraph in Kolkata in 1850, marking the beginning of telecommunications in India. Since then, there have been several changes in Indian telecommunication, including wireless, pager, and landline telephony.

In the year 1980, the first generation of wireless cellular technology, or 1G, launched the wireless mobile industry worldwide. 1G technology was never introduced in India. On July 31, 1995, a 64 Kbps data call was placed in Kolkata using the 2G (second generation of wireless cellular technology) network. Enhanced Data rates for GSM Evolution (EDGE), the subsequent generation of 2G technology, provide faster data speeds up to 128 Kbps, however, this is insufficient to transport videos, huge files, and live video streaming.

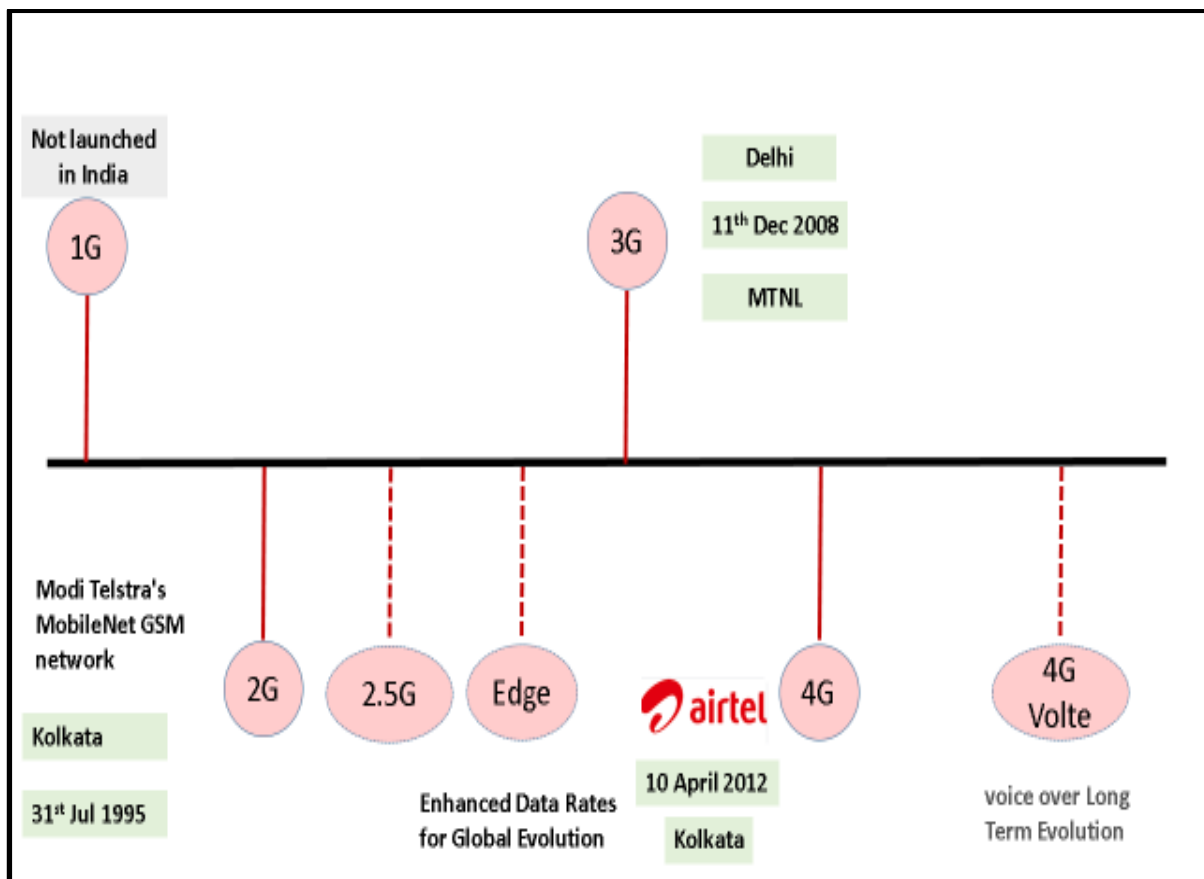


Figure no. 1.3: Indian Telecom Revolution

Source: Author

Delhi's MTNL mobile operator introduced 3G on December 11th, 2008. (third-generation wireless cellular technology). This stage enabled the mobile live video streaming function. Following this, mobile operators like MTS and RCOM attempted to use Evolution-Data Optimized (EV-DO) technology on Code Division Multiple Access (CDMA) network platforms to improve data speed performance, but they were unable to do so in India due to handset availability, as well as the technology's data speed limitations, forcing them to shut down their businesses.

On April 10, 2012, Airtel launched the country's first 4G (fourth generation of wireless cellular technology) services in Kolkata using Time-division long-term evolution (TD-LTE) technology. 4G technology was never widely used for voice during that time period; it was mainly used for high-speed data. For 4G technology services, dongles or data cards were utilised to deliver data-only services. Fewer phones were available for 4G technology, and there was no ecosystem to support the data usage, such as video streaming apps, WhatsApp, e-commerce, mobile banking, etc.

The next major development in the Indian telecom sector is the entry of Reliance Jio in 2016 which has penetrated the market with disruptive innovations. The market is being disrupted by 4G VOLTE technology during this era. Customer satisfaction has increased as a result of the 4G VOLTE technology's improvements to voice and data speed. Additionally, it has made OTT platforms for digital entertainment more accessible.

The telecom industry in India has undergone a number of changes recently; a summary of these changes is provided below.

1.3.2 4G VOLTE Technology

Reliance Jio introduced 4G Volte Technology for mobile users in September 2016 at a steep discount, and as a result, India has overtaken all other countries as the world's top data consumer with the lowest data pricing. During this era, India's smartphone industry has witnessed an exponential growth of around 19% per year (Statista, 2020).

1.3.3 Predatory Pricing Formula

Predatory pricing means selling a product below the cost of production. The Telecom Regulatory Authority of India (TRAI) has defined a significant market player (SMP) under predatory pricing which includes the variables like volume and capacity of the telecom operators. It is noteworthy that on 16th February 2018 TRAI changed the definition of significant market player (SMP) to identify the predatory pricing in the telecom industry, which gives the pricing flexibility only if the operator has a less than 30% market share of revenue or subscribers. But the revised definition of predatory pricing was held back after six months by the Telecom Dispute Settlement Authority Tribunal (TDSAT) due to the protest from incumbent operators. However, these six months turn into a golden period for Reliance Jio. It added a significant customer base as other incumbent operators could not match the pricing of Reliance Jio.

1.3.4 Interconnect Usage (IUC) Charges

This refers to the interconnectivity charges between two operators; any customer calling from one operator to another operator has to pay call termination charges. These charges were levied to recover the infra usage cost for the calls used during the termination of an incoming call. These charges have come down from 14 paise per minute to 6 paise per minute in Oct 2017 and later to nil in Jan 2021. This issue has gained the significant attention of various news agencies. As per the India rating and report published in Economics Times dated 22nd

September 2017, the reduction of charges from 14 paise per minute to 6 paise per minute in Oct 2017 has a financial impact on the earnings of the incumbent operators like Airtel and Vodafone Idea Ltd. The report says the incumbent operator lost 4%-5% EBITA and Reliance Jio benefited Rs 40 billion annually (Raj, 2017).

1.3.5 The Financial Stress on Mobile Companies

The Telecom sector in India is evolving. Though there is a significant increase in the customer base, smartphone users and data consumption patterns despite this, the service providers are under stress.

Despite of high potential in the data market, the Indian telecom sector shows consolidation because of profitability concerns; Airtel posted a loss of Rs 2,866 Cr for the first time in its history in Q1-FY'20. Vodafone Idea Ltd reports heavy losses since Q2-FY'19; Mobile service provider Aircel, Reliance Communication, Uninor, TATA DOCOMO, Videocon and other operators have closed their operations because of non-profitability. Before the year 2016 Indian telecom market was operating with 14 mobile operators which have consolidated into 4 mobile operators namely, Reliance Jio, Airtel, Vodafone Idea Ltd and BSNL / MTNL (ET Bureau, 2018).

1.3.6 Mobile Number Portability (MNP) Seventh Amendment

MNP's seventh amendment was made live on 16 December 2019. The changes in the processes are referred to in Figure no. 1.4; the significant difference in the seventh amendment is empowering the customer on the MNP withdrawal process through SMS-based action. Any customer can withdraw a request by sending a port withdrawal SMS to 1900 within 24hrs of the port request which is applicable for both individual and corporate segments of customers. Before this amendment, the customer was supposed to withdraw the MNP request by giving a written request form to the recipient operator only. On other changes, the ownership of unique porting code (UPC) generation is shifted from the mobile operator to the mobile clearing house (MCH), which helped reduce the wrong rejection of MNP requests by the mobile operator (Bhale & Bedi, 2020).

EVENT	Before MNP7th Amendment	After MNP 7th Amendment
UPC Generation	UPC was generated by TSP without any validation	UPC will be generated by MCH - "Donor" forwards the request to MCH MCH dips in operator systems via a query for customer eligibility to generate UPC (like AON, Outstanding etc.) DNO will not know the UPC code now Once UPC is generated, port out request cannot be rejected (except corporate numbers only based on authorization letter related rejections)
UPC Validity	15 days (all circles except AS, NE & JK)	4 days (all circles except AS, NE & JK)
	30 days (AS, NE & JK)	30 days (AS, NE & JK)
Port-in TAT (excluding Sundays & National holiday)	4 days from port request	Intra Circle Port-in TAT – 3 days
		Inter Circle & COCP TAT remains un-changed to 5 days
		AS/NE/JK port in TAT continues to be 15 days
Port Withdrawal (within 24 hours of port request)	Subscriber to give written request to RO within 24hrs of port-in request given.	Port withdrawal through SMS
		Subscriber can send port withdrawal SMS to 1900 within 24hrs of port request – Applicable for both Individual & Corporate requests
Non Payment Disconnection process	Donor raises request to RO (through MCH) for payment collection with MSISDN & Outstanding amount.	Additional information to be sent to MCH i.e. date of bill, last date of payment, date of notice, period of notice
	Recipient to confirm payment cleared or number disconnected within 30 days	If recipient confirms payment, MCH triggers confirmation to donor through online dip and then only request is closed.
		If DO confirms payment is not received request is closed number return process starts
		If DO receives payment, proactive trigger is sent to MCH for closure of request

Figure no. 1.4: MNP Seventh Amendment

Source: Author

1.3.7 Supreme Court Verdict Adjusted Gross Revenue (AGR)

Adjusted Gross Revenue is commonly called AGR which is nothing but the usage and licensing fee that the department of telecommunication(DOT) takes from the mobile service provider. There was a different interpretation of what needs to be considered as usage and licensing fees by the mobile service provider and department of telecommunication which resulted in a legal battle in the Indian telecom industry.

Supreme Court ended this 14-year battle between the telecom operators and DOT on 24 October 2019, the decision was favoured by the Department of Telecommunication (DOT), which clarifies the meaning of the adjusted gross revenue (AGR) of license and spectrum fees. As per the decision by Supreme Court, the AGR was defined as income from all the sources for the companies against the argument by the telecom companies that it is applicable

only from the revenue from the telecom business. This has increased the financial stress on telecom operators. As per the department of telecom, (DOT) notice to mobile companies, the liabilities that need to be paid by the companies to DOT are Vodafone & Idea: Rs 55,000 Cr, Bharti Airtel: Rs 35,000/- Cr, Aircel: Rs 11,950/- Cr, RCOM: Rs 21,921/- Cr.

1.4 SHIFTS IN CUSTOMER BEHAVIOR

The below section presents the shift in customer behaviour of mobile users

1.4.1 Single sim vs multi sim Customer

The extent of literature available in the field of the Indian Telecom industry (e.g. Matkar & Das, 2015) reveals a change in consumer behaviour. The Indian telecom market is slowly moving into a dual SIM market due to cheaper mobile offerings and incremental dual SIM handset penetration, India for example, metro telecom circles like Delhi and Chennai have already crossed the 100% teledensity, triggering the multi-SIM phenomenon in India. In this environment, the new phenomenon called zero usage churn is coming into the picture. In zero usage churn, a customer stops using the mobile SIM voluntarily, and it becomes zero users. The wireless teledensity percentage in India as of Jan'2021 and Feb'2021 is shown below in Figure no. 1.5.



Figure no. 1.5: Tele-density in India

Source: TRAI (https://tra.gov.in/sites/default/files/PR_No.27of2021.pdf)

As per leading research firm Neilson's published report on “telecom transformation: tracking the multi-SIM phenomenon: India”.

- Consumers in India are using more than one SIM card on mobile phones, and they are shifting mobile SIM depending on the available network, requirement of voice and data availability and tariff plan requirements.
- Customers carrying Multiple -SIM cards have increased by 62% between 2013 to 2015, and it is expected to continue a similar trend.
- Customer carrying multiple SIM cards is a common phenomenon among smartphone users.

The usage of Multiple-SIM cards is a new trend that customers are taking benefit of, allowing them to switch mobile service providers with the effortless change of a mobile SIM card. This allows the mobile customer to switch between mobile service providers to take advantage of price, data and service offers from the industry.

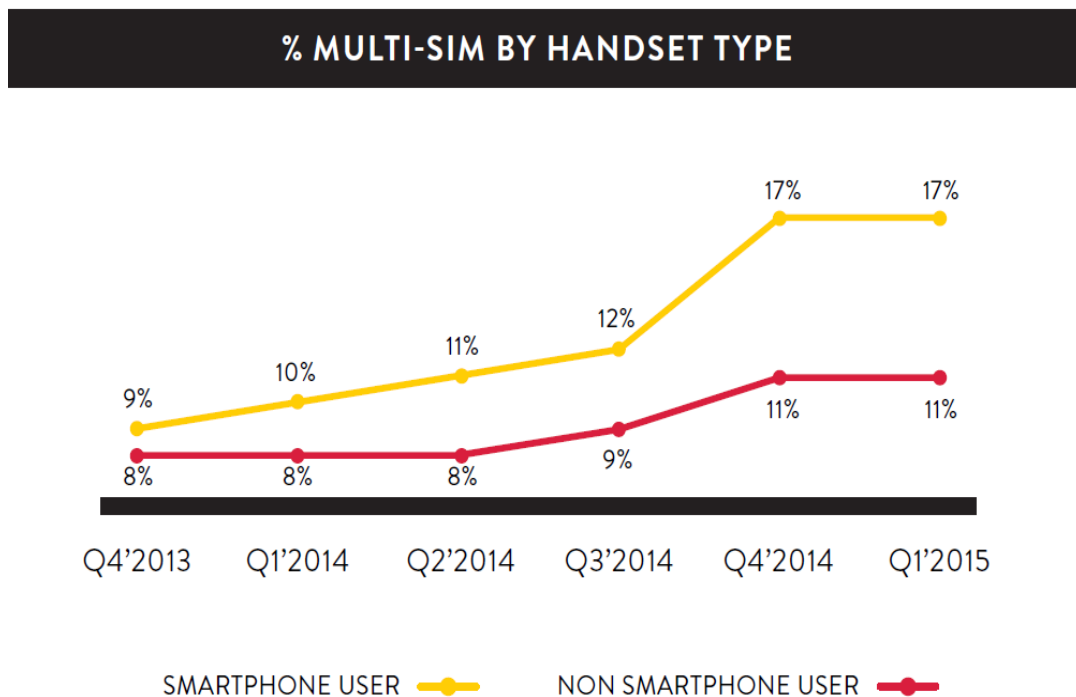
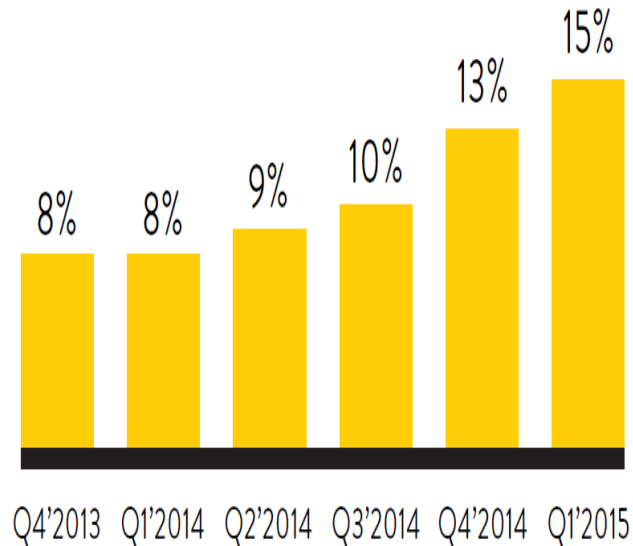


Figure no. 1.6 Multi-SIM by Handset Type (%)

Source: Nielsen (<https://www.nielsen.com/wp-content/uploads/sites/3/2019/04/nielsen-featured-insights-tracking-the-multi-sim-phenomena-in-india.pdf>)

MULTI SIM INCIDENCE IN INDIA (%)



Source: Nielsen

Figure no. 1.7 Multi-SIM Incident in India (%)

Source: Nielsen (<https://www.nielsen.com/wp-content/uploads/sites/3/2019/04/nielsen-featured-insights-tracking-the-multi-sim-phenomena-in-india.pdf>)

A business-standard report dated 7th January 2020, titled “Subscribers with two SIM cards: The next battlefield for telecom firms” says that in total 390 million customers are using multiple SIMs mobile with multiple SIM cards in India and they may look for a single SIM hence its extremely important for the telecom operators to retain these customers. Along similar lines, the study by the Cellular Operators Association of India (COAI) in the year 2020, shows that over 70 % of 4G smartphones is having double SIM slots, with SIM consolidation average revenue per user (ARPU) per month of these customers go up (they use to pay for two connections). Hence it will be extremely critical to retain these customers to maintain the overall revenue of the company.

1.4.2 Data Usage

Mobile internet (data) usage per month per user is amplified by 20% year-on-year to 13.5 GB in December 2020 as Indian customers are using about five hours daily on a smartphone which is one of the highest in the world; this has been reviled in Nokia Mobile Broadband India Traffic Index (MBiT) 2021. The report further shows that the total internet mobile data usage grew by 36% year-on-year in the year 2020, mainly due to an increase in 4G data traffic. Because of 100 million new customers, a 4G customer base crossed 700 million during the year, contributing about 99% of overall mobile internet data usage in India. The report further reveals that the 4G mobile handset base increased to 607 million units at 77% contribution. But, about 100 million customers are having 4G capable devices are still using 2G/3G mobile network services (Nokia, 2021).

The mobile smartphone emerged as the most important foundation of entertainment and yield amid the covid 19 pandemic, new mobile SIM card users from countryside areas contributed to the growing mobile internet usage. On the mobile content development side, the short video category was the highest-growing type. Because of increasing mobile internet usage, the time consumed in short video format is likely to increase four folds by the year 2025 (PTI, 2020).

1.5 CUSTOMER CHURN

Customer churn is referred to as the percentage of customers leaving the company. Customer churn is also defined as the customer moving from one service provider to another in a particular time period (Joshi,2012).

The formula for churn is defined below.

$$\text{Churn} = \frac{\text{Number of subscribers who left the company in a particular period}}{\text{Number of subscribers of the company}}$$

1.5.1 Customer Churn Types

The customer churn or attrition for the company in the given time period can be divided into two types called involuntary churn (company-initiated) or voluntary churn (customer-initiated).

Involuntary Churn (company-initiated churn) is described by Joshi (2012) as “Company initiated churn in which telecom company disconnect the customer's services”. This may be due to nonpayment of dues, regulatory, or fraud reasons.

Voluntary Churn (customer-initiated churn) is described by Joshi (2012) as “The termination of mobile services on the customer request”. The reason for this churn can be a network issue, moving out of service area, handset or SIM loss or any other issue.

MNP request is one of the significant predictors of churn. Hence it is important to study the MNP while looking at overall subscriber churn in telecom. The monthly trend of unique porting code (UPC) requests for India from April 2018 to Aug. 2019 is presented below.

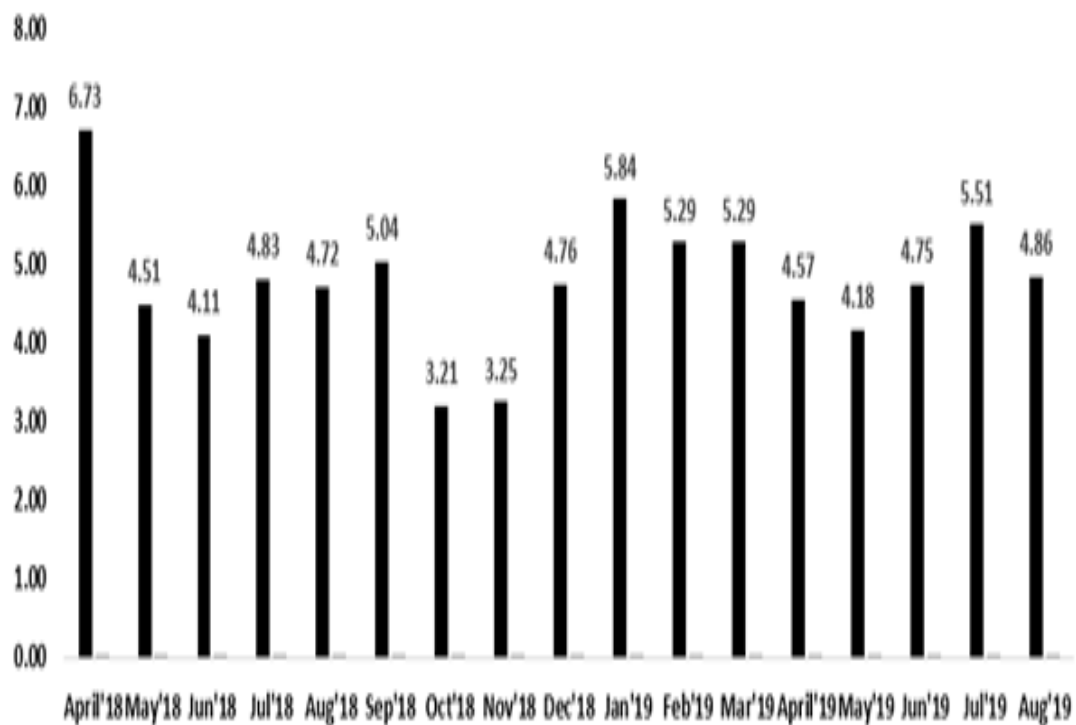


Figure no. 1.8: Monthly UPC Generation Trend in India (in Millions)

Source: TRAI

1.5.2 Churn Control Management Process

Customer churn control or retention process management is defined as searching for probable customers looking to change their services/products and then stopping them from the churn. The objective of this process is to reduce customer churn and increase company profits by securing existing money-producing customers. The churn control management process or retention process is categorised as proactive retention or reactive retention.

1.5.2.1 Proactive Retention

This type of retention includes all activities of churn prevention that help the proactive retention model or by improving the satisfaction of the customer.

There are multiple ways to reduce churn, like reducing complaints, providing a better offer etc. But the most popular method of reducing churn is to increase satisfaction with the other variables constant like price, and network quality. Another way to reduce churn is to use the brand image, customers who are having a higher brand appeal always have less churn.

1.5.2.1 Reactive Retention

This type of retention process includes all those activities to prevent the churn which are already in process for churn. All companies try to reduce churn through a proactive churn managing process, it's impossible to retain the customer with 100% perfection in proactive mode. Hence retention is the last mile approach followed by the companies. This is the last effort taken by the companies to retain customers from churn. In business terms, the prevention of unique porting code (UPC) can be prevented by resolving the issues during touchpoint interaction termed proactive churn management. On the other hand, retention efforts by service touchpoints with the customer after the generation of a unique porting request (UPC) are called reactive retention/churn control management.

The efficiency of proactive and reactive churn control management depends on customer engagement and satisfaction with service touchpoints.

1.6 CUSTOMER ENGAGEMENT, SATISFACTION AND CHURN

A robust churn control process can help telecom companies improve profitability, the mobile service provider can improve the churn management process through service touchpoints like the company's own stores, call centres, and digital channels.

Service touchpoints perform a crucial role in the churn control process or retention process; service touchpoints try to resolve customer requests, complaints, and queries through positive engagement with the customers. This increases customer satisfaction, resulting in a reduction in churn.

The telecom sector has witnessed an evident shift in customer behaviour over some time. Smartphones and Tablets have conquered the market to such an extent that they have witnessed sprawling growth in the country. The service providers now provide tailor-made service offerings as per the customer's expectations. They have multiple flexible options to choose from, making the entire task easy by enabling the customer from choosing a particular

plan as per the individual lifestyle and usage. The service channel personnel also play a significant role in the entire process since this is the interface connecting the service company and the customer. Mobile company providers also look into the aspects of how the customers are handled by the customer care executives, failing in a high churn ratio.

Customer visits any service touchpoint for a request, complaint or inquiry and expects the solution out of a visit. If any service touchpoint fails to satisfy the customer request, complaint or inquiry, it leads to dissatisfaction and subsequently leads to churn. Hence customer engagement and satisfaction play a very critical role in churn management.

1.7 MOTIVATION TO STUDY

In this new digital era, the Indian telecom sector has emerged as a critical business. Today the mobile phone has not been limited to only voice usage but has also emerged as the most important utility device for households.

Mobile telecommunication has shifted from voice products to data services. Many times, voice products with unlimited calling packages are offered free with data packages. It is interesting to quote that India has been referred to as the world's cheapest price market. In the initial stage of the evolution of the Indian telecom industry, all companies focused on the acquisition of new customers, but with the maturity of the sector and increased teledensity in the Indian telecom market, the focus shifted towards customer satisfaction and retention. Nowadays the traditional ways of engagement, satisfaction, and churn management have become absolute and companies are looking for new means (including digitalization of various processes) to satisfy and retain their customers.

The literature (e.g. McKinsey,2017; Comviva,2013) reveals that the traditional and new means of customer engagement have effects on customer satisfaction and churn. This can be understood by the example of the telecom offering before the 4G launch in India. All companies use to promote call centre touchpoint (voice-based) which has shifted to mobile app-based promotion. So, it's worthwhile to check how customers feel connected and satisfied with the different engagement channels.

Customer churn is a pain point for the entire telecom operator as it directly affects the company's profitability; Indian telecom is moving to a data-based market over traditional voice, and the reason for customer churns is changing. Hence it is worthwhile to re-check the factors affecting churn in the current context.

The average monthly mobile number portability request (MNP) in India is touching 5 million per month showing customer's intention for churn, which is causing financial stress to

the mobile operator since the cost of acquisition of new customers is high. Literature (e.g. Joshi, 2012; Mishachandar *et al.*, 2018; Blanding,2020) reveal that mobile operators are struggling to retain existing customers with existing customer engagement and satisfaction strategies. This study can help mobile service providers to design customer engagement, satisfaction and churn strategy.

1.8 RESEARCH PROBLEM

In today's competitive world, where pricing is becoming more universal, customer engagement plays a critical role. Indeed, customer engagement impacts customer satisfaction and consequently determines customer churn behaviour. The study attempts to study the attributes of Customer Engagement, determinants of Customer Satisfaction and parameters describing Customer Churn in the Indian Telecom Sector. The study examines the relationship between Customer Engagement and Customer Satisfaction in the context of the Indian Telecom Sector. The study also attempts to study the association of customer demographics with customer engagement and satisfaction. In light of these arguments, the present study is titled as below

“Customer Engagement, Satisfaction and Churn: A Study of Indian Telecom Sector”

1.9 OBJECTIVES OF THE STUDY

The thesis aims to study the below objectives.

- To identify the various attributes of customer engagement.
- To study the various determinants of customer satisfaction and their relative importance.
- To assess the association of customer demographics with customer engagement and customer satisfaction.
- To study the relationship between customer engagement and customer satisfaction.
- To assess the relevance of various parameters in describing customer churn.

1.10 SIGNIFICANCE OF THE STUDY

Looking at the extraordinary growth of the telecom industry worldwide and the level of digitalization affecting the engagement of telecom operators, it would be worthwhile to explore the various aspects of the Indian Telecom sector. The literature (e.g. Wei *et al.*,2002; Moraga *et al.*,2008; Lisbeth *et al.*,2010; Hollebeek,2011; Geetha & Lee *et al.*,2011;

Deshpande, 2012; Kumari,2012; Joshi,2012; Svendsen & Prebensen,2013; Solem,2016; Sharma & Sonwalkar,2016; Mahajan & Mahajan,2017; Deo,2017; Stella, 2019) on the relationship between customer engagement, satisfaction, and churn reveals that these are interlinked terminologies and have a positive relationship among them. If the customer is positively engaged with the company, customer churn reduces. The attempt of the present study is an endeavour to study the relationship among customer engagement, satisfaction and churn in the Indian telecom sector. The industry can utilise the said study to design an effective customer engagement strategy, which will help in the reduction of churn and improve the satisfaction matrix.

CHAPTER II

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter provides the literature on customer engagement, satisfaction and churn constructs along with underline dimensions. This chapter has adopted the following process for the identification of relevant literature in said areas of investigation.

- a. A bibliometric review of “customer engagement “customer satisfaction”, “customer churn”, “customer engagement and satisfaction” and “customer engagement, satisfaction and churn” from the Scopus database.
- b. In the second stage, various internet search engine like Google Scholar, Research Gate etc. has been explored with keywords such as “customer engagement”, “customer satisfaction”, “customer churn”, “customer engagement and satisfaction” and “customer engagement, satisfaction and churn”.
- c. In the third stage, the relevant books of the area have been identified and referred to for the study.

2.1.1 Bibliometric Analysis

The Scopus database has been referred to present the current state-of-the-art research on customer engagement, satisfaction and churn construct. The Scopus database is the most comprehensive database of published documents covering 75 million items including 0.19 million books, 16 million authors and more than 5 thousand publishers. For the current study, the “customer engagement”, “customer satisfaction”, “customer churn” and “customer engagement and satisfaction”, “customer engagement, satisfaction and churn” keywords were assessed under the “title, abstract, and keywords” search option individually. The search was restricted to documents published till the year-end of 2020.

The bibliometric analysis is a quantitative research technique having advantages like the method is transparent and results can be reproduced using the same method, the bibliometric analysis is inexpensive, scalable and takes relatively less time.

2.2 CUSTOMER ENGAGEMENT

The purpose of this section is to present a state-of-the-art review of the customer engagement construct and to synthesize the diverse through customer engagement available in the literature.

2.2.1 Bibliometric Analysis and Literature Review of Customer Engagement

The bibliometric review of the customer engagement construct is done by using the “customer engagement” keyword under the “title, abstract, and keywords” search option. The search was restricted to documents published till the year-end of 2020. The search reveals a total of 3779 documents. A detailed study of these documents is shown below.

2.2.1.1 Year-wise Analysis of Customer Engagement

The growth of the customer engagement construct has been presented in Figure 2.1. The customer engagement construct has emerged as a major research area in the last decade only. The first publication on customer engagement constructs back to the year 1974. The era from the year 1974 to 2006 received limited scholarly attention towards customer engagement and resulted in a total of 165 publications only. Exponential growth in publications of customer engagement construct has been witnessed in the era from the year 2010 to 2020.

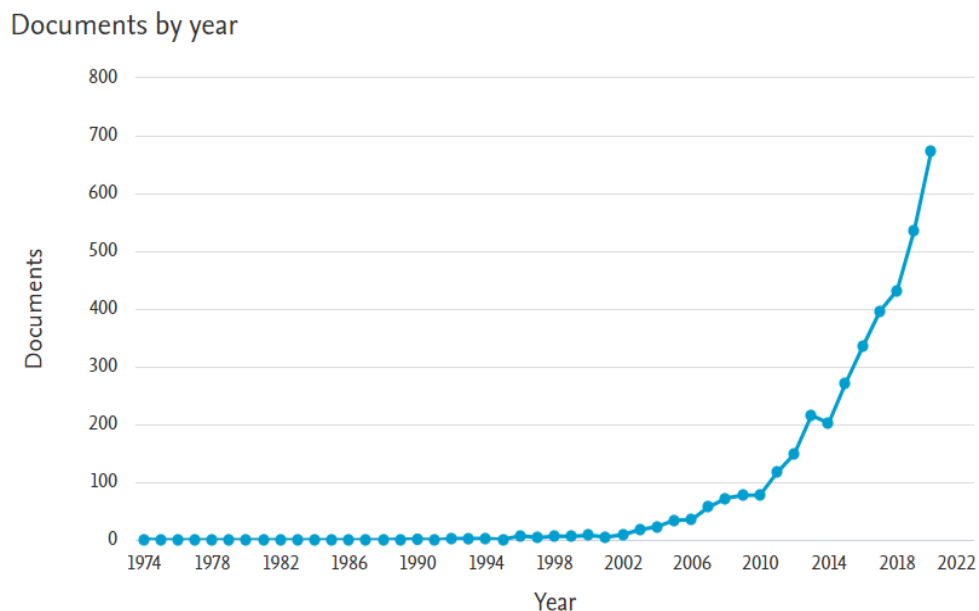


Figure no. 2.1: Year-wise Trend in Published Documents on Customer Engagement Construct

Source: Elsevier B.V

2.2.1.2 Country-wise Analysis of Customer Engagement

The customer engagement construct is a universal term and has attracted the attention of researchers across the globe. Figure no. 2.2 highlights the top ten countries with maximum publications on customer engagement construct. The United States takes the lead with 1084 publications followed by the United Kingdom (530 publications) and India (377 publications). Australia placed in the fourth position with 357 publications followed by China falls in the sixth position with 220 publications. It is significant to note that the demand for “customer engagement” is not limited to developed, underdeveloped or developing countries alone but spread across all countries on the globe.

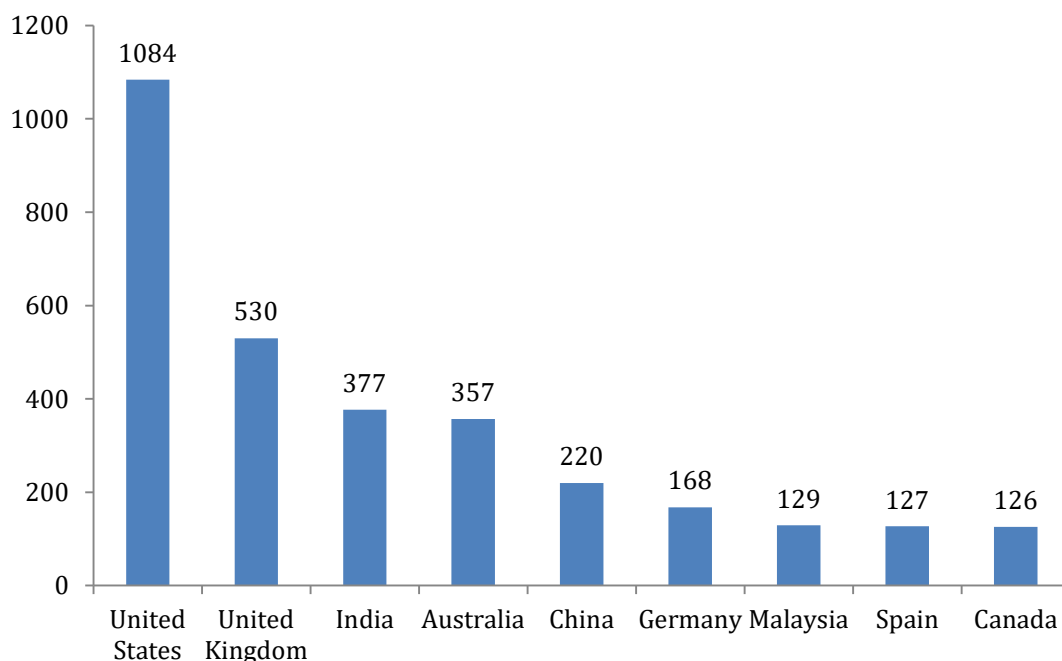


Figure no. 2.2: Country-wise Trend in Published Documents On Customer Engagement Construct

Source: Elsevier B.V

2.2.1.3. Author-wise Analysis of Customer Engagement

Table 2.1 presents the top five authors (in terms of the number of publications) on the customer engagement construct. It's interesting to see 15 publications with 1924 citations for author name Kumar V. against the publication of 17 with 551 citations for author Conduit J.

Table no. 2.1: Top Five Authors (publication-wise) and Citation on Customer Engagement

Author Name	Publication	Count of citation
Hollebeek D.	32	3240
Condiut J.	17	551
Kumar V.	15	1924
Karatepe M.	14	606
Rahman Z.	12	608

2.2.1.4. Subject-area Analysis of Customer Engagement

Publications on customer engagement are available in diverse fields. The concept of customer engagement is relevant to all functional areas. Figure 2.3 reveals that disciplines such as Business Management (30.6% publications), Computer Science (15.5% publications), Social –Sciences (11.8% publications), Engineering (10.1% publications), Economies ecomtrcis and finance (6.8% publications), decision science (5%); The above eight disciplines cover 75% of publications and rest 25% of publications are in diversified fields such as Agriculture, environment science, energy, Earth and Planetary Sciences, Chemistry, Chemical Engineering, Health Professions, Materials Science, Mathematics, Medicine etc.

It is also interesting to see that computer science is having the second higher publication subject area for customer engagement with 15.5% contribution and engineering with 10% publications.

Documents by subject area

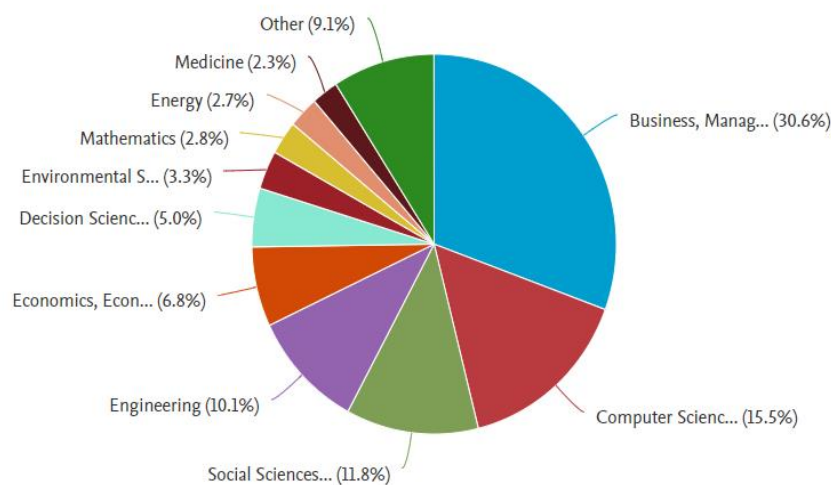


Figure no. 2.3: Subject-Area Wise Trend in Published Documents On Customer Engagement Construct

Source: Elsevier B.V

2.2.1.5. Keyword-wise Analysis of Customer Engagement

The word cloud diagram (Figure no. 2.4) presents the keyword-wise analysis. Altogether 160 keywords have been used in studies in the literature. Customer engagement, as anticipated is the maximum used keyword in the literature. The other frequently keywords used are Sales, social media, Customer Satisfaction, Social Networking (online), Marketing, Engagement, Commerce, Human, Article, Employee Engagement, Decision Making, Humans, Information Systems, Electronic Commerce, Facebook, Customer Experience, Innovation Public Relations, Co-creation, Customer Loyalty etc. it is interesting to see that out of 160 keywords, top 10 keywords are used in 76% of search enquiries.

Table no. 2.2: Frequently Used Keywords in the Customer Engagement Literature

Sr no	Top 10 Keyword	Frequency	Contribution to total publication
1	Customer Engagement	552	15%
2	Sales	465	12%
3	Social Media	424	11%
4	Customer Satisfaction	250	7%
5	Social Networking (online)	242	6%
6	Marketing	211	6%
7	Engagement	208	6%
8	Commerce	207	5%
9	Human	188	5%
10	Article	140	4%
Total		2887	76%

Source: Elsevier B.V



Figure no. 2.4: Wordcloud Diagram: Customer Engagement Keyword

2.2.1.6 Source-wise Analysis of Customer Engagement

The documents on customer engagement construct have been published in the form of conference proceedings, book chapters, reviews, conference reviews, books and notes. The description of all such publications is provided below (Table no. 2.3 and Figure no. 2.5).

Table no. 2.3: Source Wise Publications on Customer Engagement

Article	2717
Conference Paper	861
Book Chapter	238
Review	160
Conference Review	66
Book	61
Note	23

Documents by type

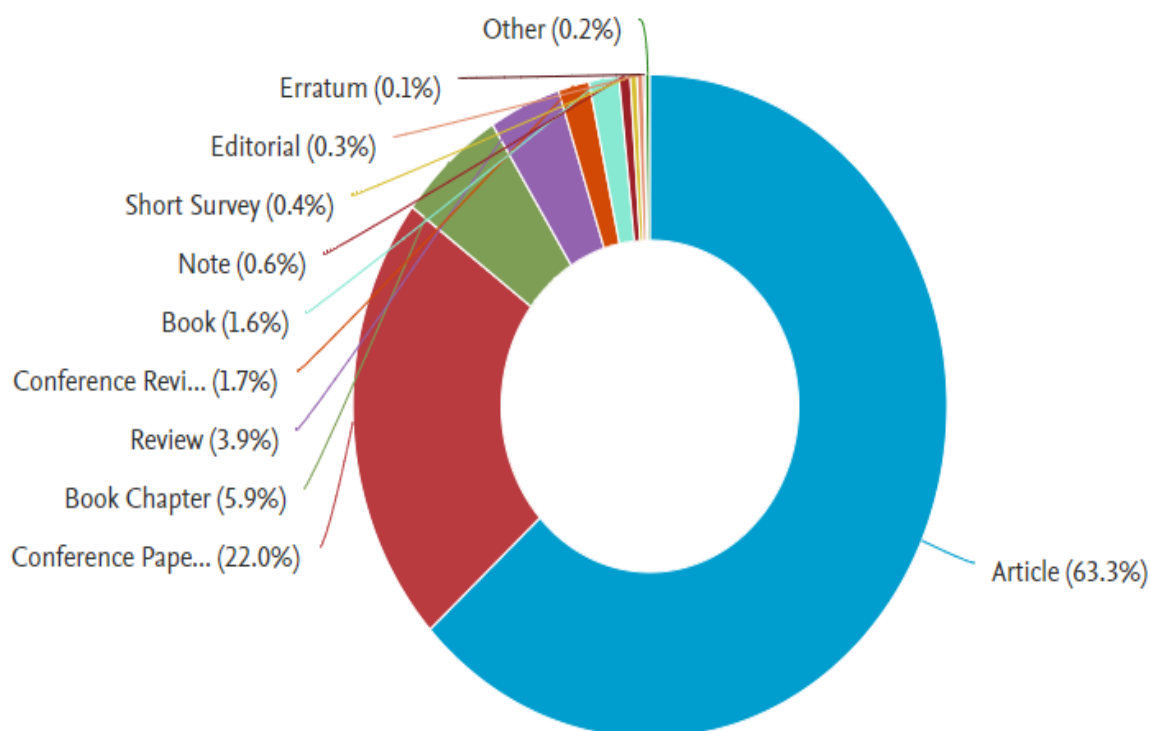


Figure no. 2.5: Source Wise Publications on Customer Engagement

Source: Elsevier B.V

2.2.1.7 Journal-wise Analysis of Customer Engagement

Figure no. 2.6 reveals that “Journal of Business Research(JBR), Journal of Services Marketing, Lecture Notes in Computer Science Including Subseries Lecture, Notes in Artificial Intelligence and Lecture Notes in Bioinformatics, Journal of Retailing and Consumer Services, Sustainability Switzerland, Proceedings of the Annual Hawaii International Conference on System Sciences, International Journal of Contemporary Hospitality Management, ACM International Conference Proceeding Series, Journal of Service Management, International Journal of Hospitality Management” are the top journals in terms of the count of documents publication.



Figure no. 2.6: Top Journals (in Terms of a Number of Publications) On Customer Engagement

Source: Elsevier B.V

2.2.1.8 Article-wise Analysis of Customer Engagement

This study tries to find the most significant work in the field of customer engagement. The documents published till the year 2020 in the Scopus database have been ranked based on the number of citations under the business management area. The top ten cited documents are presented in Table no. 2.4.

Table no. 2.4: Most Cited Documents on Customer Engagement Construct

Document title	Authors	Year	Source	Cited by
Business-unit-level relationship between employee satisfaction, employee engagement, and business outcomes: A meta-analysis	Harter, J.K., Schmidt, F.L., Hayes, T.L.	2002	Journal of Applied Psychology 87(2), pp. 268-279	1964
Reading the Romance: Women, Patriarchy, and Popular Literature (Book)	Radway, J.A.	2009	Reading the Romance: Women, Patriarchy, and Popular Literature pp.	1460
Customer engagement behaviour: Theoretical foundations and research directions	Van Doorn, J., Lemon, K.N., Mittal, V., Pirner, P., Verhoef,	2010	Journal of Service Research 13(3), pp. 253-266	1458
Customer engagement: Conceptual domain, fundamental propositions, and implications for research	Brodie, R.J., Hollebeek, L.D., Jurić, B., Ilić, ...	2011	Journal of Service Research 14(3), pp. 252-271	1379
The social influence of brand community: Evidence from European car clubs	Algesheimer, R., Dholakia, U.M., Herrmann, A.	2005	Journal of Marketing 69(3), pp. 19-34	1277
Linking organizational resources and work engagement to employee performance and customer loyalty: The mediation of service climate	Salanova, M., Agut, S., Peiró, J.M.	2005	Journal of Applied Psychology 90(6), pp. 1217-1227	1123
Customer engagement: Exploring customer relationships beyond purchase	Vivek, S.D., Beatty, S.E., Morgan, R.M.	2012	Journal of Marketing Theory and Practice 20(2), pp. 122-146	810
Collaborating to create: The internet as a platform for customer engagement in product	Sawhney, M., Verona, G., Prandelli, E.	2005	Journal of Interactive Marketing 19(4), pp. 4-17	787
Undervalued or overvalued customers: Capturing total customer engagement value	Kumar, V., Aksoy, L., Donkers, B., (...), Wiesel, T., Tillmanns, S.	2010	Journal of Service Research 13(3), pp. 297-310	612
Demystifying customer brand engagement: Exploring the loyalty	Hollebeek, L.D.	2011	Journal of Marketing Management 27(7-8), pp. 785-807	600
The process of customer engagement: A conceptual framework	Bowden, J.	2009	Journal of Marketing Theory and Practice 17(1), pp. 63-74	570

Customer engagement, buyer-seller relationships, and social	Sashi, C.M.	2012	Management Decision 50(2), pp. 253-272	561
The Role of Customer Engagement Behavior in Value Co-Creation: A Service System Perspective	Jaakkola, E., Alexander, M.	2014	Journal of Service Research 17(3), pp. 247-261	523

Source: Elsevier B.V

The above section attempts to present the state-of-the-art status of published documents on customer engagement construct on the Scopus database. The section reveals that customer engagement is an important construct had been widely used across developed, developing and underdeveloped counties.

There are 3779 documents are available on the Scopus database till the year-end of 2020. The first publication on customer engagement constructs in the Scopus database was back in the year 1974. Data on documents publications shows in recent years there is an increase in the research on customer engagement construct (year 2020: publication 675, year 2019: publications 536, year 2018: publications 432, year 2017: publication 396, year 2016: 335 publication), which is spread across all countries this shows the increasing popularity of the customer engagement constructs.

The customer engagement construct has reached to H-Index of 109 as of 31 December 2020. Customer engagement is a global phenomenon and has received the attention of researchers from all across the countries. The study discloses that publications on customer engagement are available in diverse areas such as Business, Management and Accounting, Computer Science, Social Sciences, Engineering, Economics, Econometrics and Finance, Decision Sciences, Environmental Science, Energy, Mathematics, Medicine, Psychology, Arts and Humanities, Agricultural and Biological Sciences, Materials Science, etc. The publication in the field of business management, as expected, dominates this area of research.

The highest citation paper (citation count=1964)“Business-unit-level relationship between employee satisfaction, employee engagement, and business outcomes: A meta-analysis” which is related to employee engagement” shows that customer engagement is diverse terminology used for internal customers (employees of the organization) and external customers (vendors or people who buy the products).

The analysis on the “area of research” shows that after business management (30.6 %), Computer Science (15.5%), is the second-highest area of research, this is primarily because of the increased focus on digital/online customer engagement. This can be validated in keyword analysis (Table no.2.2). Customer Engagement (count =552, contribution =15%), Sales (count =465, contribution=12%), social media (count =424, contribution =11%), Customer Satisfaction (count= 250, contribution =7%), Social Networking (count =242, contribution=6%). The same can be further substantiated by looking at the most cited document (Table no. 2.4) “Business-unit-level relationship between employee satisfaction, employee engagement, and business outcomes: A meta-analysis” which has used the meta-analysis, the other example can be taken as “Customer engagement, buyer-seller relationships, and social media” which writes about social media with a citation count of 561 with nine ranks in top 10 most cited document.

2.2.2. Conceptualization: Customer Engagement

Customer Engagement is relatively new but an important manifestation in the area of Marketing Research (Verhoef, Reinartz & Krafft, 2010). Customer engagement is described as a behavioural phenomenon that not only endorses a brand but improves customer loyalty. It is a technique to improve the connect with the customers through different means. The phenomenon of customer engagement relies upon the role of commitment, involvement, and trust in the creation of engaged and loyal customers (Bowden, 2009). According to Vivek, Beatty, & Morgan (2012), Customer engagement reflects the “intensity of an individual's participation in and connection with an organization's offerings and/or organizational activities, which either the customer or the organization initiate”.

Research carried out by different researchers on Customer Engagement (CE) shows that it is a multi-dimensional concept. Customer engagement gets displayed in the various connections that customers commence, which get shaped by individual values. The framework is not restricted to the geographical environment but also comprises the media with which the customer engages (Brodie *et al.*, 2011).

Customer Engagement is a tool for promotion and results in loyal customers. It has been seen that the highly positively engaged customers not only speak positively about the brand but also encourage others to shift to the brand. Bowden (2009) highlights the role of customer engagement in improving the repeat purchase behaviour of a customer.

The study shows that Customer Engagement is a multi-facet construct (Brodie *et al.*, 2011). There are various channels through which a company can engage its customers. It is

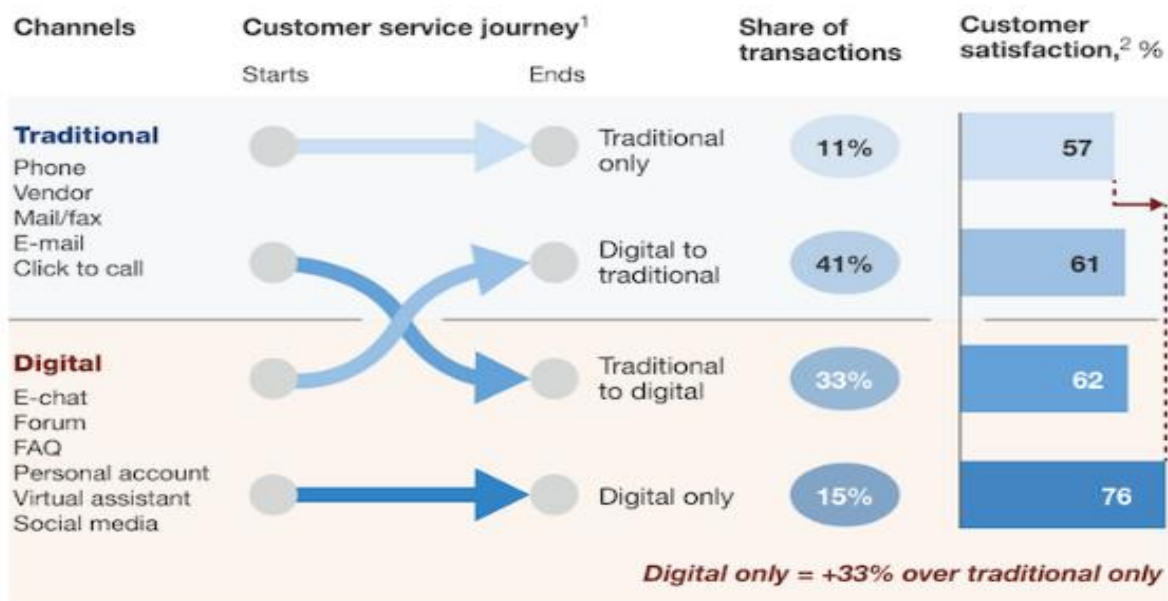
important to note that the recent change in the ecosystem of the telecommunication industry and the inclination of customers towards the internet have added different perspectives to the challenges and various other aspects of customer engagement. Earlier, companies used to consider *customer education* as a means of customer engagement. Now, the focus has shifted towards the *two-way interaction* between the customer and service provider to improve the level of customer engagement.

The diverse definitions of Customer Engagement are differentiated by various perspectives and contexts of Customer Engagement procedures. This is resolute by the brand, product, service delivery, customer profile, attitude, behaviour, messages and channels of connection which are used with consumers. In the literature, there are different definitions available for the Customer Engagement construct which are described below

- Customer Engagement (CE) is referred to as "client visits "to the service channels or company/product. The more the number of visits, the customer is referred to as more engaged (McKinsey,2017).
- The Economist Intelligence Unit describes customer engagement (CE) as, “an intimate long-term relationship with the customer”(The Economist Intelligence Unit, 2007).
- In association with marketing and service subjects, Customer Engagement is prescribed as “customers' proactive contributions in co-creating their personalized experiences and perceived value with organizations through active, explicit, and ongoing dialogue and interactions”(Hollebeek, 2011).
- Customer engagement is also defined as “the sum total of all the ways a company connect with its customers, the emails, the phone calls, conversations on social media, and more” (Appel *et al.*, 2019).
- Customer Engagement channels are defined as a different set of service enablers offered to the customer for the resolution of customer issues by the service provider (Fierro *et al.*, 2015).

In the telecom industry, the customer connects with the customer engaging channel for the resolution of his issues and if that issue gets resolved, the customer may get delighted and become the promoter of the company. The study in the Western Europe telecom market by McKinsey (2017) has differentiated digital and traditional modes of customer engagement (Figure no.2.7). Digital engagement is referred to as customer interaction without human

interface like mobile APP, social media, Interactive Voice Response (IVR), SMS based strings etc. Traditional engagement is referred to as service channels in which the customer interacts with a human agent like a call centre. In the current era, companies are pushing more digital channels which are available 24x7 without any hindrance, cost-effective and more scalable. The report reveals that Customer Engagement through digital service channels is only 15% of the total transaction despite a 21% higher satisfaction level against traditional transactions.



¹Telecom example, Western Europe; 4 service journeys were identified based on an analysis of 11 touchpoints spanning traditional and digital channels. For traditional-to-digital journeys (and vice versa), the first channel switch was used to allocate the journey.
²Respondents who ranked their satisfaction in the top 3 on a 7-point scale, where 7 = most satisfied.

Figure no. 2.7: Customer Engagement and Satisfaction Level of Service Channels

Source:

McKinsey(https://www.mckinsey.com/~media/mckinsey/dotcom/client_service/Telecoms/PDFs/Digitizing_customer_care.ashx)

Another study shows that penetration of call centre usage in the United States of America is still contributing to the highest usage around 60% of the total volume and not showing a drastic drop in from 2016 to 2020 (Figure no. 2.8). The study further emphasizes that companies need to understand the reason for satisfaction with the existing engagement service channels and try to replicate the same for digital service channels (Millard, 2016).

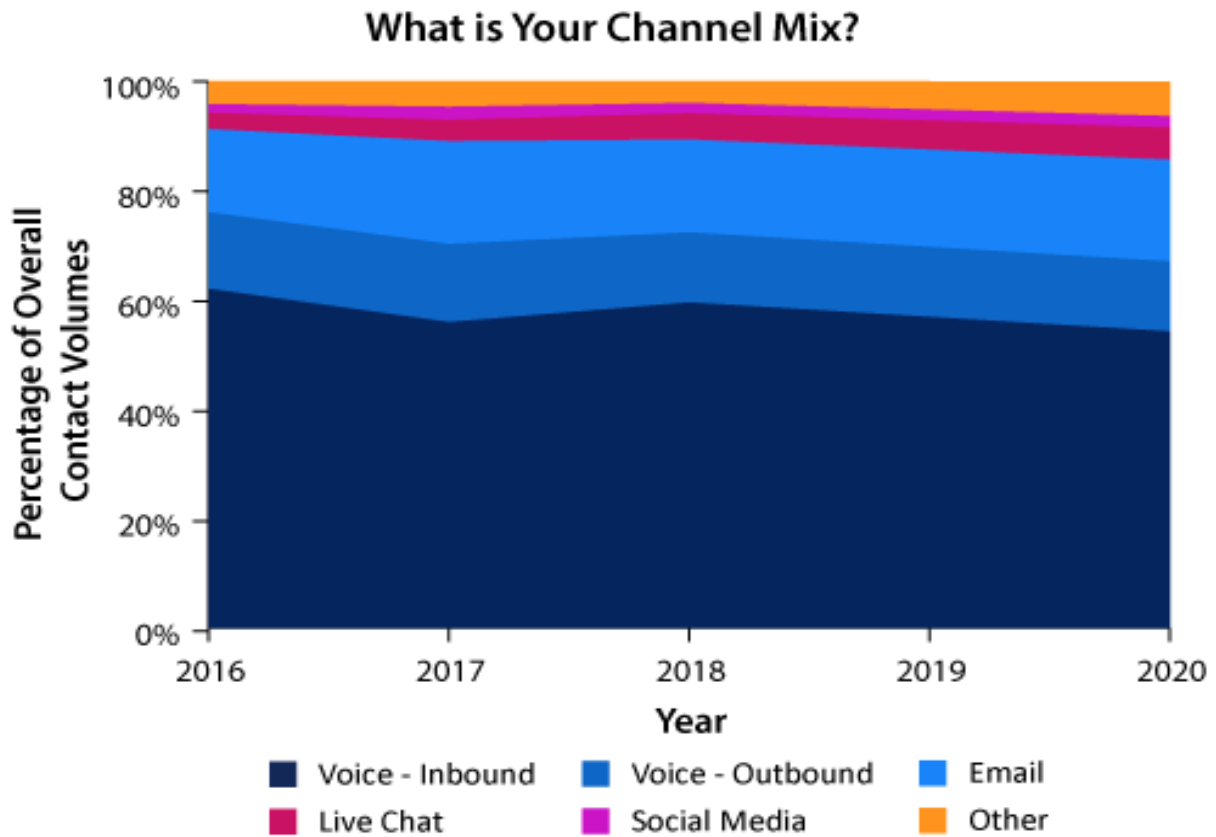


Figure no. 2.8: Customer Contact Volume for Service Channels

Source: The Call Centre Helper Report: Is Your Contact Centre Delivering Exceptional Customer Service? , 2020 Edition. (<https://www.callcentrehelper.com/trends-digital-customer-engagement-160839.htm>)

The literature (e.g., Berg, 2015; Bika, 2016; Barger et al., 2016; Millard, 2016; Robyn, 2020 and Breuer et al., 2020) reveals that consumer behaviour in the world is changing due to digitization, making it crucial for organisations to embrace the strategies in order to sustain the business. Customer engagement is the vital link that connects customers and businesses, and without a solid customer engagement plan, companies cannot be successful.

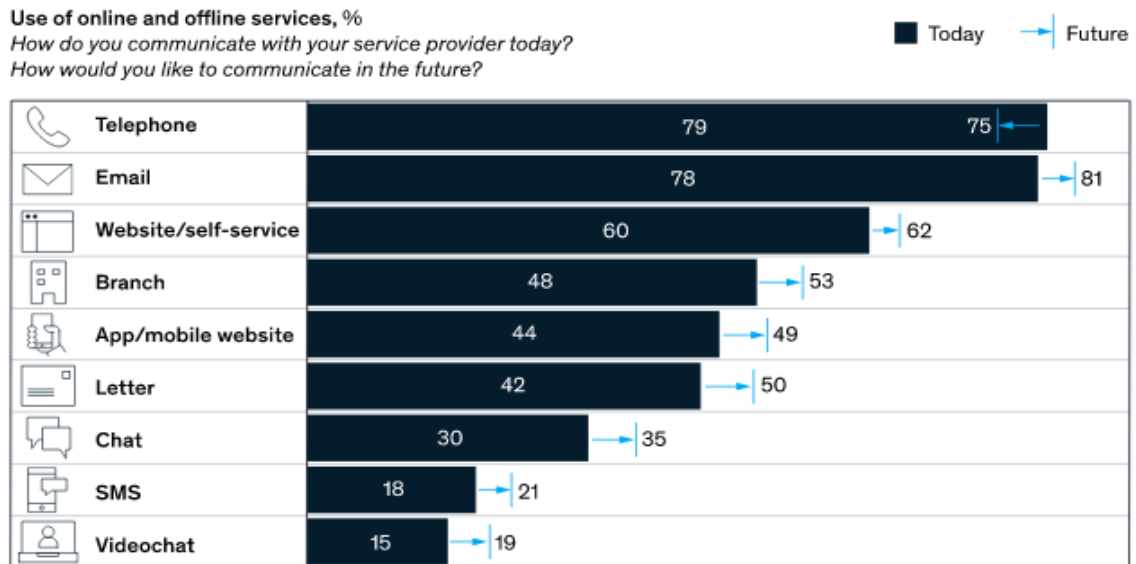
The present study attempts to explore Customer Engagement with the different types of service channels in the Indian telecom industry.

2.2.3. Customer Engagement Service Channels in Telecom

Service channels play a vital role in any service industry; in other words, service channels are referred to as “customer resolution centres”. Customers can visit the service channels for any request, inquiry or complaint about the product/services (Fierro *et al.*, 2015).

Before the launch of Reliance Jio (year 2016) in the Indian telecom industry, the preferred service channel was call centres and company stores. Latter because of the affordability of data packs and data speed, all industries started servicing through digital channels like mobile apps.

Customers are looking to interact in a variety of ways—online and offline.



Source: McKinsey TECE survey, February 2019, n = 3,610



Figure no.2.9: Customer’s Preferred Mode of Engagement with Service Provider
 Source: Mckinsey(<https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/service-industries-can-fuel-growth-by-making-digital-customer-experiences-a-priority>)

Chopra, 2014; Baxendale *et al.*, 2015 and Mckinsey 2017, reveal that there are different types of customer service channels through which Customer Engagement is possible like an inbound, outbound call centre, mobile app, chat, social media etc. In today’s digitalized environment, the mobile application is the new rising mode of engagement and it has features like cost-effectiveness, scalability, high reliability and error-free further to add this mode of engagement can support visual, video mode with multi-language support which reduces the customer’s stress on the understanding of the complex process.

Bika, 2016 categorized customer engagement as a self-assisted model and a non-self-assisted model. Self-assisted engagement service channels are those in which a customer

doesn't take assistance from humans or the people, it is like automated service. Non-self-assisted engagement service channels are referred to when the customer takes support from humans like a call centre executive or store executive etc while engaging with a company.

Literature in the area of customer engagement (e.g. Berg,2015; Bika, 2016; Barger *et al.*,2016; Robyn, 2020 and Breuer *et al.*,2020) describes call centre, email, website, store, mobile app, letter (written mode), chat, Short Messaging Services (SMS), WhatsApp, chatbot, Unstructured Supplementary Service Data (USSD), interactive voice response (IVR), social media and video chat as the widely used channels of customer engagement.

Table 2.5 present a brief description of various Customer engagement channels/parameters adopted for the current study.

Table no. 2.5 Parameters for the Measurement of Customer Engagement

Sr no	Customer Engagement Channels	Brief description
1	Multibrand outlet	Chopra (2014), Hameli (2018), Bascur and colleagues (2020) describe a multi-brand outlet as “the store or any other form of outlet sells more than one brand”. The multi-brand store is allowed to do the servicing of multiple company products/ services unlike company and franchisee-owned stores which does the servicing only for single company products/ services. This is the lower-cost model and provides a better reach customer engagement model, hence it plays an important role in the telecom industry where the required rural reach and revenue per product sold are low (Chopra, 2014).
2	Company store	Chopra (2014), Breuer <i>et al.</i> (2020), Bascur and Rusu (2020) found that company stores play important role in brand building and customer engagement in the urban market. In company-owned outlets, offices are owned by the company only. A company-owned outlet is operationally different from other models, in this case, the company keeps the store manager in the store for the day-to-day operations and the entire infrastructure owned by the

		company itself, this makes a unique service proposition in the company store. Chopra (2014), reveals that company stores are an important engagement service channel for customers in the telecom and retail industry.
3	Retail Outlet	Chopra (2014), Bascur and Rusu (2020) state that in the telecom industry retail outlet refers to the outlet which provides sales and service support along with the retailers with their existing business since this is a low-cost model with better customer reach. According to Bascur and Rusu (2020), all telecom mobile service providers prefer this service channel for sales and service. Chopra (2014), states that retail outlet is used for customer engagement by telecom companies extensive due to their cost-effectiveness.
4	Franchisee store	Chopra (2014), Ramaseshan <i>et al.</i> (2017), and Mainardes <i>et al.</i> (2019) describe the franchisee as “a franchisee is contract between owners (can be called as franchisor) and another party (may be referred to as the franchisee)”. The said contract allows the owner to use the brand name and processes of the other party, against a contract fee. Chopra (2014), states that franchisee store plays a key component in the customer engagement procedure.
5	USSD	The Unstructured Supplementary Service Data (USSD), may be called "quick codes" or "feature codes", is a transportation protocol used by mobiles to communicate with the mobile network service provider operator's computers. An example of this is *199#, *111# etc. This gives the pop-up to the customer to enter the option for submission response. Berg (2015) states that USSD is very popular among non-internet users as it gives an instant response to the customer for any information. This doesn't have a voice and picture/video feature and is primarily used for product information, activation or deactivation of service. He further reveals that USSD plays an important role in customer engagement for mobile users.
6	SMS	A short service message is also called SMS; this is a service that gives information to customers after sending a text message to a

		particular number. This has the flexibility to capture the open text unlike in Unstructured Supplementary Service Data (e.g.,*123#) services which have only an option-based response. Another constraint in this is the non-availability of local language support in this mode of customer engagement. Lai (2004), and Breuer <i>et al.</i> (2020) state that SMS service is an important medium for customer engagement as it supports both internet and non-internet-based handset.
7	IVR	Buesing <i>et al.</i> (2019) describe the interactive voice response (IVR) as“an automated phone system technology that allows incoming callers to access information via a voice response system of pre-recorded messages without having to speak to an agent, as well as to utilize menu options via touch-tone keypad selection or speech recognition to have theirs”. This technology allows incoming callers to navigate a phone system before talking to a human operator. This customer engagement channel has unique features like it is voice-based and can be integrated into an artificial intelligence platform with a very high degree of scalability, hence making it a very important element of customer engagement across industries including telecom (Abide & Zuhail, 2019).
8	Call centre	Jaiswal (2008) states that a call centre is a centralized place of work used for the reception or transmitting a big scale of enquiries by telephone. An inbound call centre is operated by an organization to manage incoming service support or enquiries from customers. Outbound call centres are operated in which the company out-called the customer selling or servicing. Call (2018) and Breuer <i>et al.</i> (2020) states that the call centre is an important driver of customer engagement which contributes close to 60% of customer engagement volume in the United States in the year 2020 for industries including hospitality, telecom, banking etc.
9	Website	Customers can lodge service requests through the website. Most service industry companies provide website services including telecom operators (Connell <i>et al.</i> , 2019). Since mobile apps are

		having limitations on screen size, website-based services are used by companies to provide more detailed information to the customer, this makes the website an important customer engagement service channel for the service provider (Breuer <i>et al.</i> , 2020).
10	Email	Doorn <i>et al.</i> (2010) state that sending an email to the mobile service provider is another way to engage with the mobile service provider by the customer. During this process, the customer writes to the mobile service provider's designated email id for the solution or service. This is extensively used when the customer is unable to use the services of the mobile service operator (Breuer <i>et al.</i> , 2020).
11	Written mode	Breuer <i>et al.</i> (2020) state that written communication plays a critical role when a customer wants physical acknowledgement of his communication with the mobile service provider. This type of customer engagement is used in multiple industries and plays a significant role in customer engagement. During the process of written communication customer engagement process, the customer sends a written letter to the company at its designated address. As this is the physical movement of the request/complaint, the time required to respond is more through this channel.
12	Webchat	In a webchat, the customer does the chat with the agent by typing on the internet-based interface in the chatbox. The text can be converted to a chatbot that has the intelligence to predict and instant response to a customer issue, hence making it the fast way of response (Frimpong, 2017). The study reveals that webchat plays an important role in customer engagement in many service industries including telecom (Mclean & Breuer <i>et al.</i> 2020).
13	Call Back	The call back service doesn't require internet or a smartphone with the customers, hence it is used by multiple industries like banking, travel, telecom etc. Call-back is a service facility for a company that has a high volume of incoming calls in a shorter time. With

		<p>the call-back facility, you can make phone queues so that the consumers don't have to wait for their turn (Elliott 2019). In another way, the customer can send an SMS from his registered mobile number or through the website to book an appointment with the service agent of the company. The call back facility provides flexibility to customers making it an important engagement channel for the service providers (Soluno, 2020).</p>
14	WhatsApp	<p>WhatsApp is a modern way used by customers to engage with mobile service providers. Industries like banking, DHT and insurance etc. are using this service channel. In telecom, Customers can get the resolution just by engaging with the service provider on WhatsApp. This automated engagement media provides faster resolution of customer issues and hence plays a critical role in customer engagement, but this has limitations it required internet connectivity and a smartphone (Kumar & Sharma, 2017; Comeche & Ruthven, 2021).</p>
15	Mobile APP	<p>A mobile application is also described as a mobile app or an app. It is a computer program or software application made to run on a phone. Mobile applications were invented for assistance such as email, calendar, contact databases etc., but the public demand for apps caused rapid expansion into other areas such as mobile games, factory automation, banking transaction, Global Position System(GPS)and location services, client order tracking, and bus/train/movie ticket purchases, various bill payments, etc. Mobile application is used to provide wide services across industries nowadays (Breuer <i>et al.</i>, 2020). Here mobile app is called a mobile app that is provided by the mobile service provider. Many services like payment, network information, product information, product update etc. can be provided by the mobile app. The limitation of this customer engagement channel is that it required smart phone with higher internet speed (Dinner <i>et al.</i>, 2015).</p>

16	Social media	<p>According to Robyn (2020), Social media customer engagement is more than just the gathering of follower's information across social apps.</p> <p>Companies which are having social media engagement service channels can take advantage of improved, marketing reach and rate on investment and sales. Hence social media is important for customer engagement (Peltier <i>et al.</i>, 2016; Kohlmeyer 2017; Appel <i>et al.</i>, 2019).</p>
17	Third-party app	<p>Recently in India because of cheaper data services and increased smartphone penetration, mobile APP adoption has increased multifold (Gupta & Singh,2017). Third-party apps like Google pay, Paytm, Amazon pay etc. are providing many kinds of services like instant recharge on balance expiry, product information, recharge reminder etc. that helps customer service, resulting in customers are using these apps to engage with the service providers and making this as key customer engagement channels (Breuer <i>et al.</i>,2020).</p>
18	Chatbot	<p>Chatbot is one of the digital engagement channels (Robyn, 2020),. The Chatbot helps an organization to save costs and provides faster and more reliable services, it gives organizations the chance to save some money (McLean & Osei-Frimpong, 2017; Breuer <i>et al.</i>,2020).</p>

2.3 CUSTOMER SATISFACTION

The purpose of this section is to present the state-of-the-art review of customer satisfaction construct and to synthesize the diverse through on customer satisfaction available in the literature.

2.3.1. Bibliometric Analysis and Literature Review of Customer Satisfaction

The “customer satisfaction” keyword has been evaluated in the “title, abstract, and keywords” search option on Scopus. For this study, the search was restricted to documents published till the year-end of 2020. This procedure resulted in the detection of 61,225 documents. The details about the 61,225 documents are as below

2.3.1.1. Year-wise Analysis of Customer Satisfaction

The growth of the customer satisfaction construct has been presented in Figure no. 2.10. The customer satisfaction construct has gained attention for the last two decades and it's showing continually interest by researchers. The first publication on customer satisfaction constructs back to the year 1928. After the year 1990, it gained popularity with an average of 2331 publications per year from 2010 to 2019. The construct has shown higher publications between the years 2003 to the year 2007 as high as 5507 publications in the year 2004, it's interesting to see that after the year 2015, the construct is again becoming more popular among the researchers. Publication count per year can be summarised as 2015: 1853, 2016:2065, 2017:2121, 2018: 2433, and 2019:2864.

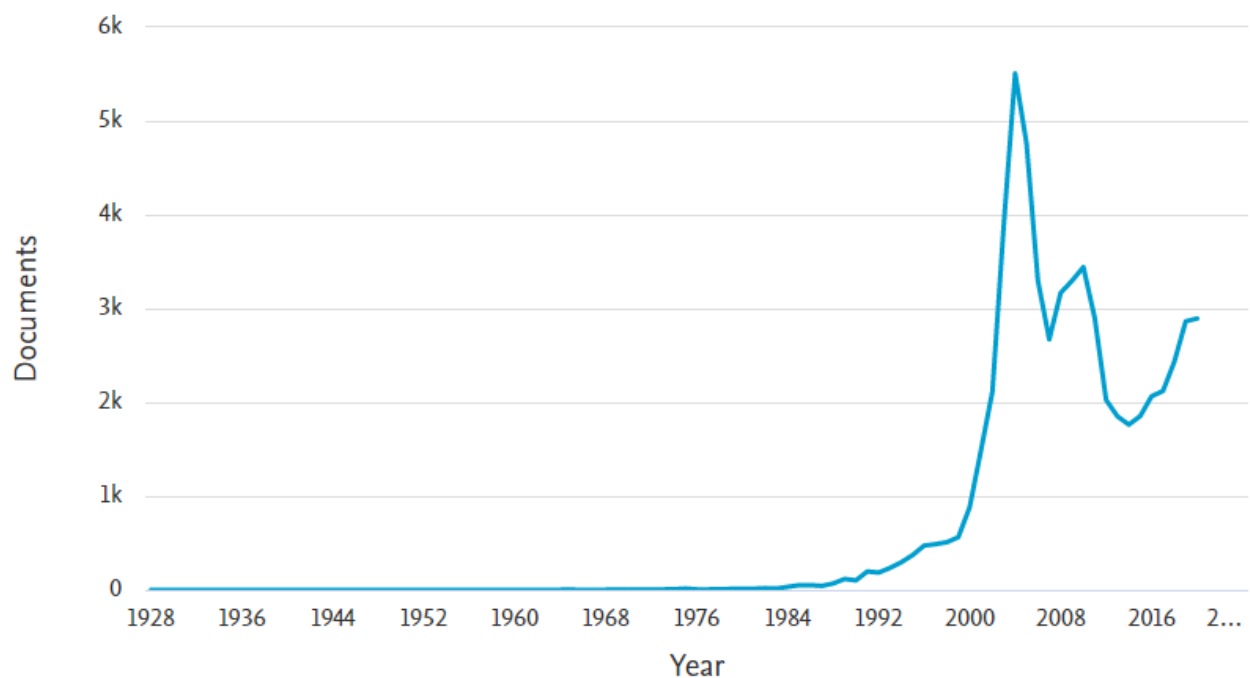


Figure no. 2.10: Year-Wise Trend in Published Documents on Customer Satisfaction Construct

Source: Elsevier B.V

2.3.1.2. Country-wise Analysis of Customer Satisfaction

The customer satisfaction construct is a worldwide phenomenon and has attained the attention of researchers across the globe. Figure no.2.11 highlights the top ten countries with maximum publications on customer satisfaction construct. Developed countries like the United State of America (13627 publications) is leading in publication count followed by

China (6331 publications). And the United Kingdom (with 3348 publications) India falls in the fourth position with 3069 publications. Point to be noted that the demand for customer satisfaction and services is not limited to underdeveloped or developing markets alone.

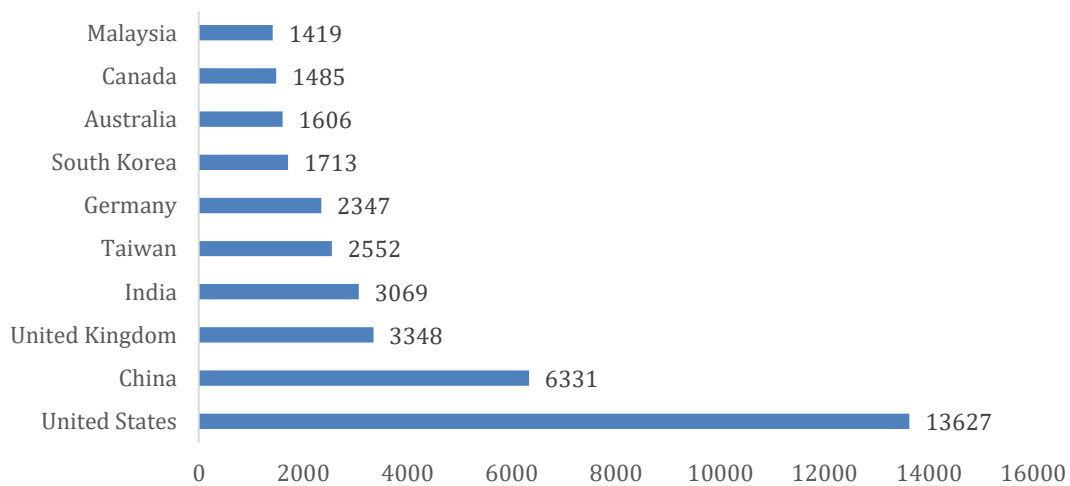


Figure no. 2.11: Country-Wise Trend in Published Documents On Customer Satisfaction Construct

Source: Elsevier B.V

2.3.1.3. Author-wise Analysis of Customer Satisfaction

Table no. 2.6 represents the top five authors (in terms of the number of publications) on the customer satisfaction construct. It is interesting to see that Anon and Tinham Author with 43 publications has received only 5 and 7 citations only.

Table no. 2.6: Top Five Authors (Publication-Wise) on Customer Satisfaction Construct

Sr. No.	Name	No. of Publications	No. of Citations
1	Mattila A.S.	57	4543
2	Han H.	52	3856
3	Choy K.L.	44	1185
4	Anon	43	5
5	Tinham B.	43	7

Source: Elsevier B.V

2.3.1.4. Subject-area Analysis of Customer Satisfaction

Publications on customer satisfaction are available in diverse fields. The concept of customer satisfaction is relevant to all functional areas. Figure no. 2.12 reveals that disciplines such as Engineering (24% of total publications, count 26322 publications), Business Management (19.2% of total publications, count 21379 publications), Computer Sciences (16.1% publications of total publications, count 17793 publications) occupy a major space in this domain.

Documents by subject area

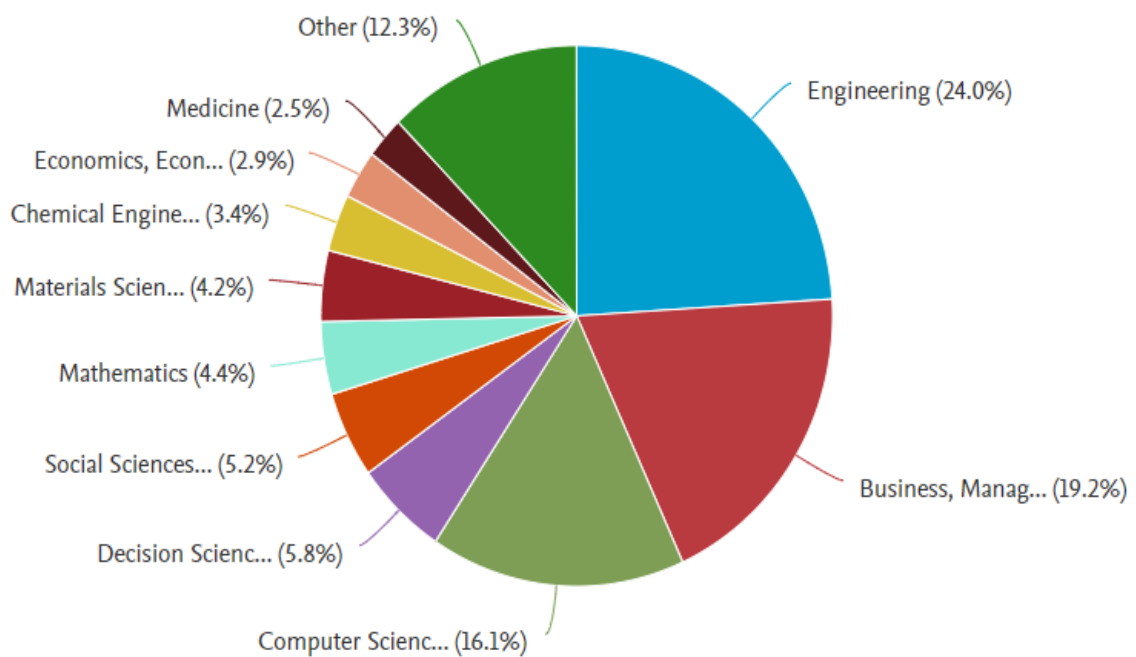


Figure no. 2.12: Subject-Area Wise Trend in Published Documents On Customer Satisfaction Construct

Source: Elsevier B.V

2.3.1.5. Keyword-wise Analysis of Customer Satisfaction

The keyword-wise analysis is presented in Table no. 2.7. In total 160 keywords have been used in studies in the literature. Customer satisfaction is the highest used keyword in the literature contributing to 71% of the total documents. The keywords such as Sales, Marketing, Quality Control, Costs, Competition, Total Quality Management, Industrial

Management, Electronic Commerce, Product Development, Decision Making, etc. are the most frequently used keywords.

Table no.2.7: Frequently Used Keywords in the Customer Satisfaction Literature

Keywords	Publication	Contribution to Total Publication
Customer Satisfaction	44194	71%
Sales	11863	19%
Marketing	5694	9%
Quality Control	4511	7%
Costs	3995	6%
Competition	3286	5%
Total Quality Management	3110	5%
Industrial Management	3071	5%
Electronic Commerce	2950	5%

Source: Elsevier B.V



Figure no. 2.13: Wordcloud Diagram: Customer Satisfaction Keyword

Source: Elsevier B.V

2.3.1.6. Source-wise Analysis of Customer Satisfaction

The documents on customer satisfaction construct have been published in the form of books, book chapters, conference proceedings, journals, and trade publications. The description of all such publications is provided below (Table no. 2.8 and Figure no. 2.14).

Documents by type

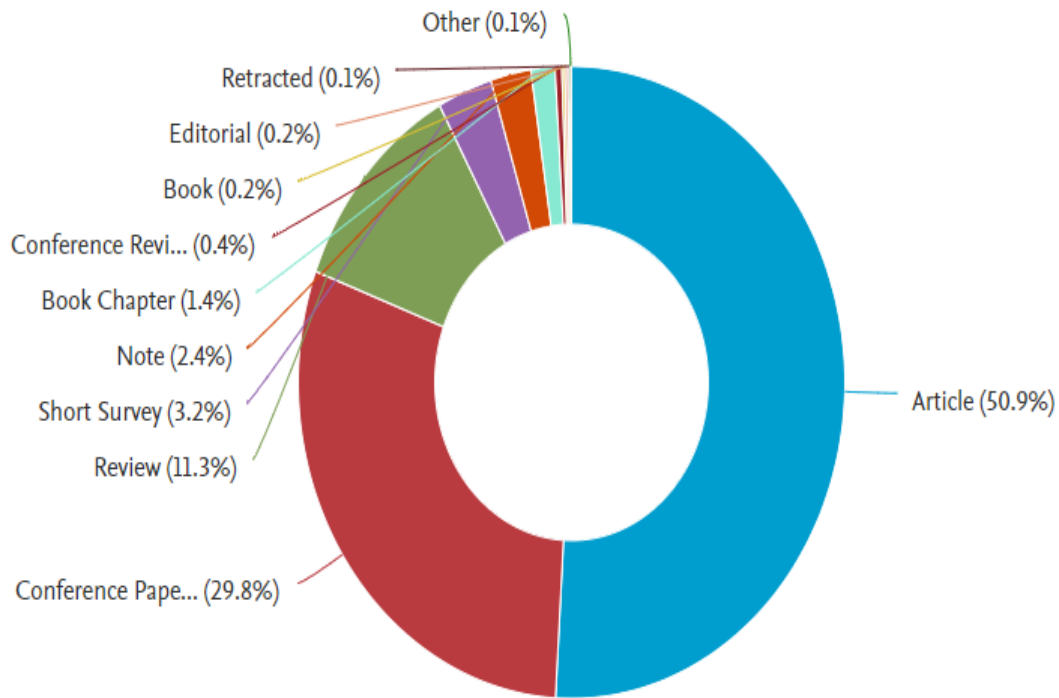


Figure no. 2.14: Source Wise Publications on Customer Satisfaction

Source: Elsevier B.V

Table no. 2.8: Source Wise Publications on Customer Satisfaction

Source Type	Publications
Journal	34548
Conference Proceeding	15457
Trade Journal	9190
Book Series	2510
Book	879
Report	7
Undefined	22

Source: Elsevier B.V

2.3.1.7 Journal-wise Analysis of Customer Satisfaction

Figure no. 2.15 reveals that the journal “Lecture Notes in Computer Science Including Subseries, SAE Technical Papers, ACM International Conference Proceeding Series, International Journal of Production Research, Expert Systems with Applications, Journal of Services Marketing, European Journal of Operational Research, official Board Markets, Quality Progress, Total Quality Management and Business Excellence” contributing highest count of publications.



Figure no. 2.15: Top Journals (in Terms of a Number of Publications) On Customer Satisfaction Construct
Source: Elsevier B.V

Table no. 2.9: Top Cited Documents on Customer Satisfaction Construct

Sr No	Document title	Authors	Year	Source	Cited by
1	The balanced scorecard--measures that drive performance.	Kaplan, R.S., Norton, D.P.	1992	Harvard business review 70(1), pp. 71-79	6765
2	Mining and summarizing customer reviews	Hu, M., Liu, B.	2004	KDD-2004 - Proceedings of the Tenth ACM SIGKDD International Conference on Knowledge Discovery and Data Mining pp. 168-	4299
3	Finding community structure in very large networks	Clauset, A., Newman, M.E.J., Moore, C.	2004	Physical Review E - Statistical, Nonlinear, and Soft Matter Physics 70(6 2),066111, pp. 066111/1-066111/6	3361
4	Assessing the effects of quality, value, and customer satisfaction on consumer behavioral intentions in service	Cronin Jr., J.J., Brady, M.K., Hult, G.T.M.	2000	Journal of Retailing 76(2), pp. 193-218	3346
5	Business models, business strategy and innovation	Teece, D.J.	2010	Long Range Planning 43(2-3), pp. 172-194	3050
6	Zero defections: quality comes to services.	Reichheld, F.F., Sasser Jr., W.E.	1990	Harvard business review 68(5), pp. 105-111	2939
7	The different roles of satisfaction, trust, and commitment in	Garbarino, E., Johnson, M.S.	1999	Journal of Marketing 63(2), pp. 70-87	2485
8	The American Customer Satisfaction Index: Nature, purpose,	Fornell, C., Johnson, M.D., Anderson, E.W., Cha,	1996	Journal of Marketing 60(4), pp. 7-18	2287
9	Business-unit-level relationship between employee satisfaction, employee engagement, and business outcomes:	Harter, J.K., Schmidt, F.L., Hayes, T.L.	2002	Journal of Applied Psychology 87(2), pp. 268-279	1964
10	Brand Experience: What Is It? How Is It Measured? Does It Affect Loyalty?	Brakus, J.J., Schmitt, B.H., Zarantonello, L.	2009	Journal of Marketing 73(3), pp. 52-68	1545

Source: Elsevier B.V

The above study reveals that the customer satisfaction construct is widely used in different streams in different forms and plays a significant role in business. The needs and requirements of customers differ for each country/society. Hence the customer satisfaction construct is popular among researchers across the globe.

The insights of year-wise publications reveal that document publications on customer satisfaction have gained the attraction in last 5 -6 years though the momentum has been reached from 2000 to the year 2008. The insights of bolometric analysis propose customer satisfaction as a multi-facet and multi-dimensional construct having its presence in various functional areas such as engineering, business management, computer engineering, decision science, social science, mathematics, material science etc. The documents published in the field of engineering are topping the chart with 24 % followed by business and management at 19.2%, this may be primarily because of the shift in new technologies and the digital environment.

2.3.2. Conceptualization: Customer Satisfaction

The survival of businesses in the marketplace is conditioned by a count of satisfied clients. Customers are the key factor for survival and business growth in the marketplace. Businesses that want to face the competition, need to deliver valuable and exceptional terms to their customers that will satisfy their requirements. This satisfaction comprises not only the emotional state associated with the purchasing process but also the experience provided before and after the execution of the acquisition process(Woodruff, 1996; Anderson & Srinivasan, 2003; Anderson *et al.*, 2004).

Customer satisfaction is often related to customer gratification(Rahman,2014). Products or services, that are a foundation of satisfaction, provide the anticipated value to their customers. Literature (e.g. Rahman, 2014; Kumar, 2015; Saha *et al.*, 2016; Pascal, 2016; Mitter, 2019) specifies, that “Satisfaction is a judgment, an opinion expressed by the customer. The degree of satisfaction reflects the gap between the customer’s vision of the expected product and the customer’s perception of the delivered product”.

Customer satisfaction is the indicator of how the desires and responses are collaborated and delivered to outshine customer hopes. In today’s competitive professional marketplace, customer satisfaction is a key performance indicator and an important differentiator of company strategies. Hence, the more customer satisfaction; the more the

business and the attachment to the customer (Fornell, 1992; Smart *et al.*, 1993; Zeithaml *et al.*, 1996; Podstawy *et al.*, 2006; Bitner, 2001).

Philip Kotler (2017) describes customer satisfaction as “the feeling of a person from comparing the performance of products/services in the result of his /her expectation”. He further states the benefits of satisfaction which are noted as “an increased level of customer satisfaction helps to reduce customer attrition to competition. Dissatisfied customers are more inclined to search for an alternative for product/services and more likely to crop to suggest competitors offers than is satisfied, customers”. In the current aggressive digital Indian telecom market, customers have many feasible options to select among the mobile service company. Hence, mobile service operators should focus on the satisfaction factor and be added as a focus area while forming a strategy (Anderson & Srinivasan, 2003; Anderson *et al.*, 2004).

There are different methods of measuring customer satisfaction like net promoter score (NPS), and customer loyalty index; how much would you miss us? repeat purchase rate, upselling ratio, and customer engagement number (Pascal, 2016). The most popular customer satisfaction matrix is the net promoter score. Fred Reichheld developed a net promoter score in the year 2003 to understand the relationship between people and loyalty in the company. Net promoter score asks one most important question “How likely are you to recommend a product /service?” Not only has this but also asks how satisfied a customer is.

The Satisfaction construct has been studied by various researchers globally the different definitions by the researcher on satisfaction can be listed below

- According to Woodruff (1996), customer satisfaction has been defined as “The positive or negative feeling of a customer in association with the value customer received as a result of using a particular product or service given in a particular situation”.
- Assessment of purchased goods or services (Westbrook *et al.*, 1998).
- Individual impressions are designed slowly by frequent consumer experiences with the goods and amenities of the organization (Lisowski, 1999).
- Sense knowledge by consumer having used the offer meeting his prospects (Kotler, 2000).
- The consumer estimation about the degree of agreement of dealings in relative to essentials and expectations (Skrzypek *et al.*, 2000).

- The customer satisfaction construct has been defined by Aleksander (2003) as “The reaction of circumstances in which the final product or service given by the company meets a set of customer requirements”.
- The purchaser’s consciousness that his hopes were completely met or surpassed by the company he/she was served (Lotko *et al.*, 2004).
- The satisfaction affected by gaining somewhat, satisfying needs is a condition of desire resulting from the exact motive (Olejniczak *et al.*, 2004).
- The client’s understanding of the degree to which the client wants has been satisfied (Podstawy *et al.*, 2006).
- David (2012) defines customer satisfaction as “the count of customers, or fraction of total customers who conveyed experience with a company about goods or services surpasses stated satisfaction objectives of the company”.

The literature (e.g. Woodruff, 1996; Lotko *et al.*, 2004; Podstawy *et al.*, 2006; David, 2012; Rahman, 2014; Kumar, 2015; Saha *et al.*, 2016; Mitter, 2019) reveals that customer satisfaction is very important for the company. The benefits of customer satisfaction for telecom carriers are numerous. Customer loyalty can be increased through increasing satisfaction; satisfied consumers are more likely to do business with a company for an extended period of time, which increases sales and profitability.

2.3.3. Significance of Customer Satisfaction

Customers are inclined to competition if the company fails to maintain customer satisfaction as customer attrition from non-satisfied customers is high. In process of customer churn, Customers tend to complain to the existing company rather than to the external environment and they can spread negative word-of-mouth publicity if the complaint is unresolved. The last step could be attrition from the existing company since they are not satisfied with the service (Zeithaml *et al.*, 1996; Bitner, 2001).

In the concept of service recovery and customer satisfaction, the study by Maxham (2001), Zeithaml *et al.* (1996), Smart *et al.* (1993) and Fornell (1992) strongly opposes the thought of service recovery and suggest that instead of doing the service recovery, companies should improve the satisfaction level of the customer at the first time only, service recovery is damage control and first-time fix gives more customer satisfaction than the service recovery. A satisfied customer further spread positive notations about the organization and this helps in enhancing the brand image of the service provider. Customer

satisfaction when combined with the theory of service recovery delivers the best results for the service provider.

Customer satisfaction has numerous benefits for telecom operators. Higher satisfaction can help to improve customer loyalty; when customers are satisfied, they are likely to stay with a business for a long, which boosts sales and profitability. A satisfied customer has less propensity to connect with the service channel of the service providers hence this can help in reduction in the service cost of the service provider.

The telecom vertical of Tech-Mahindra company named Mahindra Comviva (2013) in its research titled “Winning with Real-time Insights a Multi-SIM Market” highlighted the below points

- Indian telecom is moving to multiple SIM environments.
- Telecom companies can win the saturated market if they manage the customer experience and satisfaction.
- Companies need to understand the satisfaction and Customer churn phenomenon in a new environment.
- Customer reasons for churn and satisfaction differ for single SIM and multiple SIM mobile users.
- Need to do more study on Customer satisfaction in the telecom market, if companies need to sustain themselves in the competitive market.

Khan (2013) describes the characteristic of service performance and customer satisfaction in the telecommunication industry. As per the study customer satisfaction is the key differentiator for the company in the hyper-competitive market, hence customer satisfaction plays an important role in the company's strategy formation. Customer satisfaction can be used to give the indicator of customer loyalty and purchase indicators; hence customer satisfaction data is regularly collected by companies to understand the market perception.

According to Kate (2020) and Diegmann *et al.*(2017) sometimes organizations are misguided by the belief that clients depend on organizations. The fact of the matter is that organizations very much depend on clients. They further add that the level of client satisfaction has a positive result on the profitability of organizations. A completely satisfied client contributes 2.6 times more revenue to an organization. However, the dissatisfied client is likely to tell another ten persons about their bad experience and its impact on revenue (Rahman, 2014; Kumar, 2015; Saha *et al.*, 2016; Mitter, 2019).

2.3.4. Factors Influencing Satisfaction in Telecom Sector

Customer satisfaction is defined as “The client’s understanding of the degree to which the client wants has been satisfied” by Podstawy *et al.*, 2006. Another study by David (2012) defines customer satisfaction as “the count of customers, or fraction of total customers who conveyed experience with a company about goods or services surpasses stated satisfaction objectives of the company”.

The different studies on Customer satisfaction reveal various attributes affecting customer satisfaction which are described below

The study by Joshi *et al.* (2015), Briganty (2019) and Mitter (2019) on Over the Top (OTT) reveal that customer churn propensity for the mobile customers from OTT users is less than the customers which don’t use OTT for mobile service provider. Hence telecom companies need to have a strategy on how to improve the OTT penetration among their users.

Oliver (1980) reveals that “the background of customer delight function include customer expectations and disconfirmations, and the consequences of customer delight include positive influences on post-purchase attitude, intentions and satisfaction”. This is also supported by Javalgi *et al.* (2005). After the 4G mobile internet revaluation in India telecom over-the-top (OTT) platform are becoming more and more popular and study shows that this has an impact on customer satisfaction (Joshi *et al.*, 2015; Briganty, 2019).

The study on customer satisfaction and its influencing factors shows that communication, engagement activity and new technology attributes play important role in brand building and satisfaction (Joshi, 2012; Kate, 2020; Diegmann *et al.*, 2017). Failure in transparent communication may lead to dissatisfaction with the customer and may impact the business matrix for the company.

Price is used to gauge the quality of that product, reflects in improved prospects from the product or services and reflects in better satisfaction. The study displays that price directly affects satisfaction verdicts as well as indirectly over perceptions of price justice (Herrmann *et al.*, 2009, Eggert & Ulaga, 2002). Price affordability and consumer satisfaction are expressively linked terminologies. The customers can switch to any other mobile operator that offers a better price than the competition that consumers are using product/ service since long. Customer satisfaction is caused by the fairness of the price (Ali *et al.*, 2010). Price is considered to be one of the crucial factors affecting the level of satisfaction of the customers (Athanasopoulos, 2000; Ali *et al.*, 2010; Darwin *et al.*, 2017). In the same context, the study done by Stephane *et al.* (2019) in the Chad telecommunication market shows a relationship

between satisfaction and price. Here in this research product tariff is taken as a price term as the price is referred to as tariff in telecommunication and the same is used by Chakraborty and Sengupta (2014).

Value-added service (VAS) is a very common telecom industry term for non-core facilities, all facilities beyond voice calls and fax are generally considered an element of value-added services (VAS). However, it can be used in any industry, for services available at less or no cost, to promote the company's a product/ service promotion. Offering several kinds of value-added services allows companies to stand out from the competition. They provide advantages not only to the service providers but also to the customers. While the consumers get something above and beyond their basic requirements; the companies enjoy an increased rapport with the consumers, capable of translating into more revenue. Even if these consumer services cost some more bucks to both sides; these services have the potential of significantly enhance growth and practicability. The Value-added services in the telecom industry are broadly classified as caller tune, missed call alerts, and global positioning services (GPS). Various studies show that VAS play an important role while deciding customer product preference and satisfaction (Rahman, 2014; Das,2014; Joshi,2015; Kumar, 2015; Saha *et al.*, 2016).

Service recovery is a very critical aspect of customer satisfaction and goodwill gesture play an important role in service recovery and satisfaction. Goodwill can be in terms of monetary benefits or surprise delights that increase customer loyalty and satisfaction (Kim *et al.*, 2004).

Wang and colleagues (2002) have described responsiveness, solving customer issues, of service channels as one of the predictors of customer satisfaction. On a similar line, Negi (2009) reveals that in the telecom service industry for any issue customer service channel has to be responsive to the customer and must fulfil the promises made. Research (e.g. Wang *et al.*, 2002; Lai *et al.*, 2007; Joachim *et al.*, 2008; Joshi,2015; Kumar, 2015; Saha *et al.*, 2016) reveal that customer becomes more dissatisfied when the customer service channel doesn't respond to the customer. Hence responsiveness and solving customer issues is a very critical influencing factors for satisfaction (Leisen *et al.*, 2001; Wang *et al.*, 2002; Lai *et al.*, 2007; Joachim *et al.*, 2008; Negi, 2009).

High-speed mobile broadband has opened up new avenues for entertainment like online gaming, and online movies. Yang and colleagues (2009) state that online gaming, video buffering/streaming experience and network coverage play an important role in

customer satisfaction. Mobile signal quality (voice and data) and mobile network strength in the given area have been important reasons for selecting mobile companies by the customers. In earlier years, when the mobile industry had not developed, the mobile operator's network coverage was available only in a few areas. Since India is still going on 4G mobile network expansion hence network coverage has an impact on customer satisfaction. The literature (e.g. Yang *et al.*, 2009; Qiu & Cui, 2011; Ahmed *et al.*, 2012) reveals that availability of the network, calls congestion, voice quality, call drop, and mobile network coverage, SMS service has an influence on the consumer's satisfaction level.

Research in the Malaysian telecom market on customer satisfaction shows that accuracy in customer billing accuracy, product tariff, goodwill, new product technology, and security concerns are the reasons that decided customer satisfaction with the mobile operator (Ishan *et al.*, 2018).

Research by Yapa (2009) on telecom customer satisfaction shows that 'customer care people management is an important aspect while deciding the customer satisfaction. The willingness of the agent, empathy, skill and knowledge, service capability, attentive and first-time-right are some of the attributes that help to improve satisfaction (Alexandris *et al.*, 2002; Akroush *et al.*, 2015; Blanton, 2016). The way the customer care people resolve the complaint, within the promised time is equally important. According to Bitner (1990), the extent of involvement of service personnel while interacting with customers impacts the degree of customer satisfaction (Bitner,1990).

When it comes to achieving customer satisfaction, organizations should be more focused on infrastructural issues like store ambience which communicate the best service outputs to the customers. According to Mc Kenna (1991), aspects such as customer engagement activity, service availability, and service consistency, cannot be ignored while describing customer satisfaction. Literature (e.g., Bloemer *et al.*, 1999; Hawari *et al.*, 2009; Gulycz,2010 etc.) also pay a due emphasis on various dimensions of service quality such as the documentation process used during onboarding or servicing of the customer and promise fulfilment while describing customer satisfaction construct.

Organizations should concentrate more on infrastructure concerns like retail ambience, which communicate to customers the best service outputs, in order to increase customer happiness. Mc Kenna (1991) asserts that when describing customer happiness, factors such as client interaction activity, service availability, and service consistency cannot be disregarded. When describing the customer satisfaction construct, literature (e.g., Bloemer *et al.*, 1999; Hawari *et al.*, 2009; Gulycz, 2010) also gives due emphasis to various aspects of

service quality, such as the documentation process used during onboarding or servicing of the customer and promise fulfilment.

The documentation process utilised during client onboarding or servicing, promise fulfilment, and other aspects of service quality are all highlighted in the literature (e.g., Bloemer et al., 1999; Hawari et al., 2009; Gulycz, 2010) as an important aspect for customer satisfaction.

Though the literature specifies various attributes of customer satisfaction constructs it is important to highlight that the factors influencing customer satisfaction change with technology and socio-economic advancements (Herrmann *et al.*, 2009; Eggert & Ulaga, 2002). As Indian telecom is moving to 4G technology the factors affecting satisfaction also changing. As per the Nokia Mobile Broadband India Traffic Index (MBiT) 2021, the average monthly data usage per user in India increased 20% year-on-year to 13.5 GB in December 2020. The smartphone emerged as the primary source of entertainment and productivity; the study reveals that new users from rural areas also contributed to the rising monthly data usage. With surging internet users, the total time spent monthly on short content is expected to grow four times by 2025. This shows that there has been a shift in customer usage behaviour for Indian telecom customers. These changes in an ecosystem have impacted customer satisfaction. Hence there is an urgent need to study the factors influencing customer satisfaction in the Indian telecom sector.

2.4 ASSOCIATION OF CUSTOMER DEMOGRAPHIC PROFILE WITH CUSTOMER ENGAGEMENT & SATISFACTION

It has generally been seen that customers with different profiles often respond differently to a given stimulus (Oyewole,2008). Understanding the customer demographic profile may help an organization in fulfilling the needs of customers with limited resources (Zeithaml,2000). The study of demographic is studied across various industries by researchers like the hotel industry, telecom, and banking. The study on “the effect on the demographic factors on customer satisfaction from ATM” in Iran by Mirzagoli and Memarian (2015) shows that residential status, occupation, gender, education and material status have a significant impact on customer satisfaction. A similar kind of study was done by Volker *et al.* (2016) in “The influence of socio-demographic variables on customer satisfaction and loyalty in the private banking industry”. Volker and colleagues find that employment status, gender, and marital status moderate the degree of customer satisfaction. The study in the Airlines industry by Oyewole(2008) in “Consumer's Socio-Demographic Characteristics and Satisfaction with

Services in the Airline Industry” reveals that customer age and domestic income had no influence on consumer satisfaction construct; the demographics like customer’s gender, occupation, education, and marital status is influencing customer satisfaction constructs in the aviation industry.

The study made by Rai *et al.* (2013) in the medical sector in their research has shown an association of the customer demographics with Mhealth care (Mobile health care) or doctor’s personal visit. In another research on online shopping behaviour on the online travel experience, the study made by Koundinya (2017) shows the significant association between gender, and education with customer’s online train ticket behaviour, whereas age and profession were found to be insignificant.

Customer engagement and demographic impact are studied by the researcher from various perspectives. The study by Christia and Ard (2016) on the “Influence of Demographic Characteristics in Service channel” was done on the age, occupation, and ethnicity of the United States customer. The research shows a significant association of customer's age and occupation on customer engagement with service channels whereas no association with ethnicity. The researcher on demographic study suggests that the association of constructs like customer satisfaction, churn, and engagement with customer demographic varies from country to country or region to the region (Kassim,2007; Qayyum *et al.*, 2013; Webster, 1989; Aliah,1999). Hence in a changing environment like the 4G market in the Indian context demographic study need to revisit in Indian telecommunication customer perspective.

Kassim (2007) in his article about the Malaysian telecom industry “Telecommunication Industry in Malaysia: Demographics Effect on Customer Expectations, Performance, Satisfaction and Retention” studies the demographic effect of telecom customers on four constructs customer expectations, performance, satisfaction and retention. The study on customer demographic with the multivariate covariance shows that there is a significant association between the customer demographic and customer expectation, performance, satisfaction and churn constructs. The demographics taken for the study were gender, age and education. The study by Abdul Qauum and Do Ba Khang (2013) in the Pakistan telecom industry shows no association of the customer age bracket on satisfaction while an association exists between satisfaction between customer satisfaction and gender.

In consumer satisfaction/dissatisfaction literature, the effects of demographic variables are discussed. The literature review demonstrates that demographic factors such as

age and gender affect consumer satisfaction (Webster, 1989; Levesque & McDoughall, 1996; Zeithaml, 2000). However, the literature expresses worry that the study was restricted to demographics in European nations, the United States (Aliah, 1999), and/or restricted regions. Consequently, the conclusions' applicability to the Indian setting is unclear. Alongside this, India is undergoing a 4G technology revolution, which has resulted in more reasonable pricing for customers; therefore, it is interesting to examine the demographic influence on customer happiness.

2.5 CUSTOMER CHURN

The purpose of this section is to present the state-of-the-art review of customer churn construct and to synthesize the diverse through customer churn available in the literature.

2.5.1 Bibliometric Analysis and Literature Review of Customer Churn

To study the customer churn, construct the “customer churn” keyword that has been assessed under the “title, abstract, and keywords” search option. Documents published till the year-end 2020 have been taken for analysis. This process resulted in the identification of 1305 documents. The analysis of the documents is described below

2.5.1.1 Year-wise Analysis of Customer Churn

The growth of the customer churn construct has been presented in Figure no. 2.16. The customer churn construct has emerged as a major research area in the last decade only. The first publication on churn constructs was back in the year 1981. The year from the year 1981 to 2010 received limited scholarly attention towards customer churn. Exponential growth in publications of customer churn construct has been witnessed in the era from the year 2008 to 2020. During this span of 12 years, a total of 1159 documents were published.

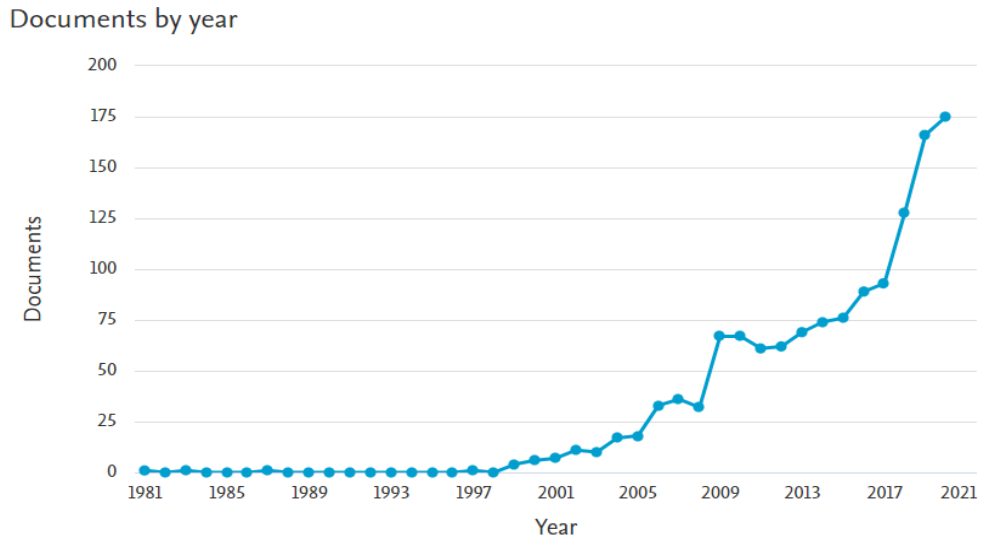


Figure no. 2.16: Year-Wise Trend in Published Documents on Customer Churn Construct

Source: Elsevier B.V

2.5.1.2 Country-wise Analysis of Customer Churn

The customer churn construct is a universal phenomenon and has attained the attention of researchers across the countries. Figure no. 2.17 highlights the top ten countries with maximum publications on customer churn. China takes the lead with 262 publications followed by India (208 publications) and the United States of America (197 publications).

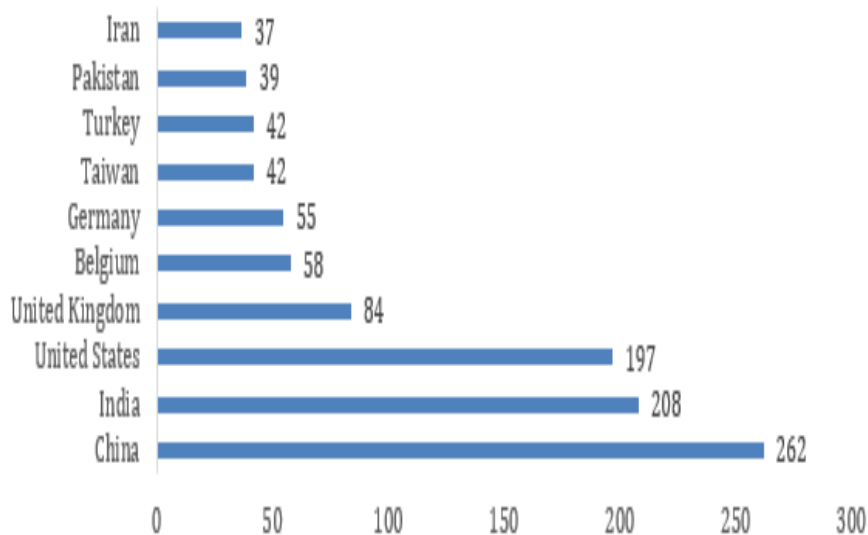


Figure no. 2.17: Country-Wise Trend in Published Documents On Customer Churn Construct

Source: Elsevier B.V

2.5.1.3 Author-wise Analysis of Customer Churn

Table no.2.10 presents the top five authors (in terms of the number of publications) on customer churn construct. It is interesting to see that three authors are having 12 documents published each but have a high variance on the citation count like author Anwar S. with 316 and Van Den Poen D. with 1518 citations.

Table no. 2.10: Top Five Authors (Publication-Wise) On Customer Churn Construct.

Sr. No.	Name	No. of Publications	No. of Citations
1	Baesens B.	25	1041
2	Xiao J.	13	147
3	Amin A.	12	324
4	Anwar S.	12	316
5	Van Den Poel D.	12	1518

Source: Elsevier B.V

2.5.1.4 Subject-area Analysis of Customer Churn

Publications on customer churn are available in diverse fields. The concept of customer churn is relevant to all functional areas. Figure no. 2.18 reveals that disciplines such as Computer Science (37% publications); Engineering (19% publications); Business Management (11.1% publications); Mathematics (10.1% publications); have their dominance in publications on customer churn construct. Other publications are in diversified fields such as decision science, social science, physics, energy and economics etc.

Documents by subject area

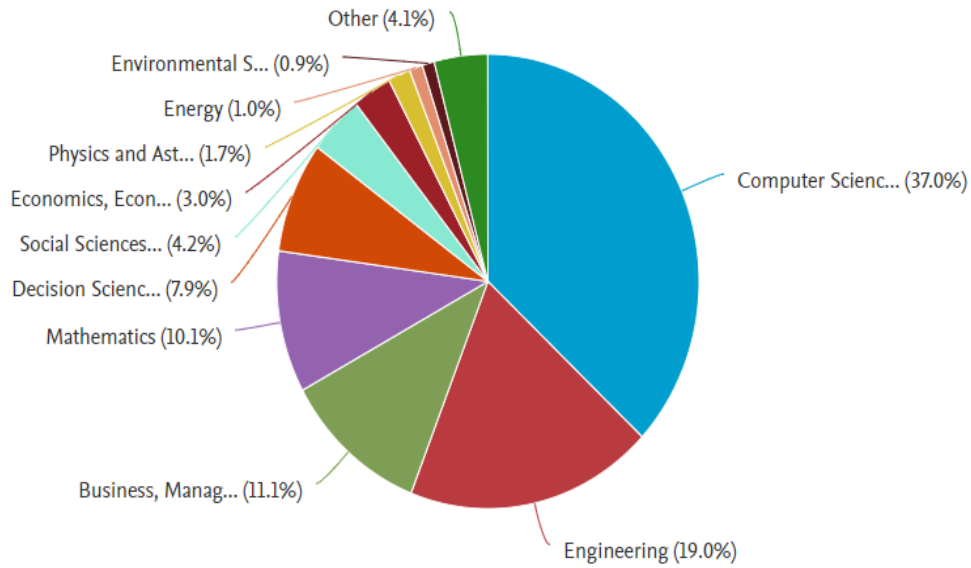


Figure no. 2.18: Subject-Area Wise Trend in Published Documents On Customer Churn Construct

Source: Elsevier B.V

2.5.1.5 Keyword-wise Analysis of Customer Churn

The keyword-wise analysis is presented in Figure 2.19, 160 keywords have been used in studies in the literature. It is important to note that ‘sales’, is the highest used keyword in the literature. Followed by forecasting, data mining, and churn prediction. On the other side word, ‘churn’ is having a count of 908 out of 2692. Since churn word is clubbed with other words like churn prediction, customer churn prediction could not be reflected in large font in word cloud diagram analysis.

Table no. 2.11: Frequently Used Keywords in the Customer Churn

Keyword	Count	Count with the word" Churn"
Sales	642	0
Forecasting	383	0
Data Mining	327	0
Churn Prediction	243	243
Customer Churn Prediction	240	240
Customer Satisfaction	226	0
Churn Predictions	220	220
Decision Trees	206	0
Customer Churn	205	205
Total	2692	908

Source: Elsevier B.V



Figure no. 2.19: Wordcloud Diagram: Customer Churn Keyword

Source: Elsevier B.V

2.5.1.6 Source-wise Analysis of Customer Churn

The documents on customer churn construct have been published in the form of books, book chapters, conference proceedings, journals, and trade publications. The description of all such publications is provided below (Table no. 2.12 and Figure no. 2.20).

Documents by type

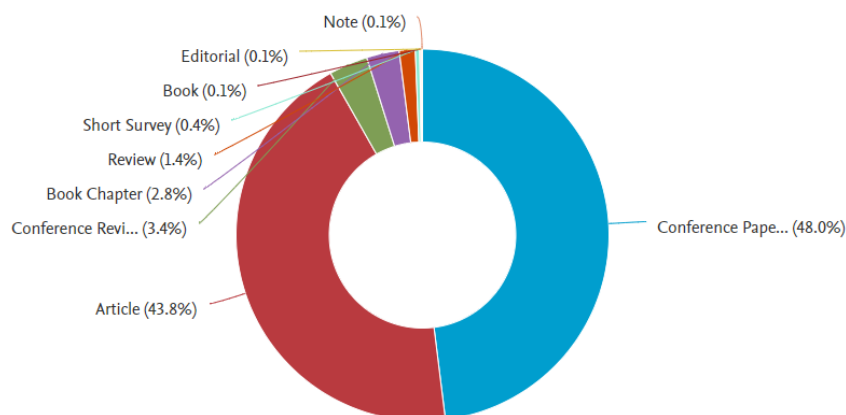


Figure no. 2.20: Source Wise Publications on Customer Churn Construct

Source: Elsevier B.V

Table no. 2.12 Source Type Document on Customer Churn Construct

Source Type	
Journal	625
Conference Proceeding	543
Book Series	182
Book	27
Trade Journal	18

Source: Elsevier B.V

2.5.1.7 Journal-wise Analysis of Customer Churn

The churn construct has an H-Index of 67 (as per the Scopus database by year-end 2020). Figure no. 2.21 reveals that “Lecture Notes in Computer Science Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics, Expert Systems with Applications, Advances in Intelligent Systems and Computing, ACM International Conference Proceeding Series, Communications in Computer and Information Science, International Journal of Recent Technology and Engineering” are having the highest publications.

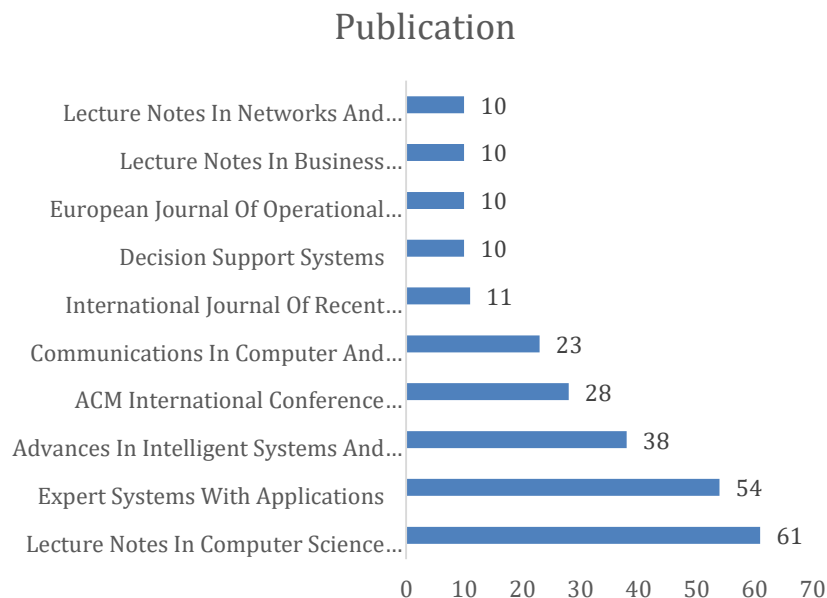


Figure no. 2.21: Top Journals (in Terms of a Number of Publications) On Customer Churn Construct

Source: Elsevier B.V

Table no. 2.13: Top Documents (in Terms of a Number of Citations) On Customer Churn Construct

Sr No	Document title	Authors	Year	Source	Cited by
1	The effects of customer satisfaction, relationship commitment dimensions, and triggers on customer retention	Gustafsson, A., Johnson, M.D., Roos, I.	2005	Journal of Marketing 69(4), pp. 210-218	813
2	Customer switching behaviour in online services: An exploratory study of the role of selected attitudinal, behavioural, and demographic factors	Keaveney, S.M., Parthasarathy, M.	2001	Journal of the Academy of Marketing Science 29(4), pp. 374-390	306
3	Defection detection: Measuring and understanding the predictive accuracy of customer churn models	Neslin, S.A., Gupta, S., Kamakura, W., Junxiang, L.U., Mason, C.H.	2006	Journal of Marketing Research 43(2), pp. 204-211	305
4	Applying data mining to telecom churn management	Hung, S.-Y., Yen, D.C., Wang, H.-Y.	2006	Expert Systems with Applications 31(3), pp. 515-524	293
5	Turning telecommunications call details to churn prediction: A data mining approach	Wei, C.-P., Chiu, I.-T.	2002	Expert Systems with Applications 23(2), pp. 103-112	271

6	Handling class imbalance in customer churn prediction	Burez, J., Van den Poel, D.	2009	Expert Systems with Applications 36(3 PART 1), pp. 4626-4636	266
7	Identification of influencers - Measuring influence in customer networks	Kiss, C., Bichler, M.	2008	Decision Support Systems 46(1), pp. 233-253	260
8	Churn prediction in subscription services: An application of support vector machines while comparing two parameter-selection techniques	Van den Poel, D.	2008	Expert Systems with Applications 34(1), pp. 313-327	255
9	An LTV model and customer segmentation based on customer value: A case study on the wireless telecommunication industry	Hwang, H., Jung, T., Suh, E.	2004	Expert Systems with Applications 26(2), pp. 181-188	247
10	A novel evolutionary data mining algorithm with applications to churn prediction	Au, W.-H., Chan, C.C., Yao, X.	2003	IEEE Transactions on Evolutionary Computation 7(6), pp. 532-544	235

Source: Elsevier B.V

The above study shows that the customer churn construct is gaining more popularity among researchers in recent days.

2.5.2 Conceptualization: Customer Churn

Churn is measured on the count or revenue unit; it is defined as customers leaving the company or services in a particular time period. As per The American Heritage Dictionary of the English language, Churn can be described as “The number of consumers who moves from one company to another company”.

In the telecom industry, customer churn is described as the behaviour of mobile phone and internet users to move from one mobile operator to another. Customer churn is a basic unit of the telecom service industry, which is used to label customer loss, indeed described as the total customer attrition during a specified timeframe. It evaluates a mobile service provider’s consumer retention effort and provides an understanding of the growing or weakening of the customer base as well as the average span of contribution to the service. In the telecom industry after the introduction of mobile number portability (MNP) service, customers can decide on services amongst many service operators without changing their existing mobile number, unlike in the banking service industry you need to change your bank account number once change your service provider, this makes churn process easy for customers and results in high customer churn in the telecom industry (Wei & Chiu, 2002; Coussement & Poel, 2008).

The customer churn construct has been studied by many researchers. The customer churn definitions are described below

- Customer churn in the telecom industry has been defined as customer decrement (Modisette, 1999).
- Customer churn is defined as leaving one service/product and moving to another service/product (Hadden, *et al.*,2005).
- Customer churn is also known as the erosion of customers (Yang & Chiu, 2006).
- Churn is also referred to as a customer leaving a certain product in the company and moving to another product for the same company (Joshi, 2012).
- The tendency of the subscriber to exit the services of one service operator is termed churn (Phadke *et al.*,2013).

In today's hyper-competitive digital world, companies are looking for new ways to maintain profitability ever before. The telecom industry is no exception in which customer acquisition cost is more in comparison with customer retention cost (Hejazinia & Kazemi, 2014). As per the Association of Unified Telecom Service Providers of India, a study in 2012 the mobility churn in India was 6%, one of the highest in the world; which creates an

opportunity for service providers to review the subscriber churn, hence as a first step in this process understanding the factors affecting customer churn is very important. This study can help companies can build the process and strategies to improve customer churn (Gartner, 2012).

The extent of available literature (e.g., Wei *et al.*,2002; Geetha & Lee *et al.*,2011; Deshpande, 2012; Kumari,2012; Joshi,2012; Sharma & Sonwalkar,2016; Deo,2017) on customer churn construct attempts to draw the attention of mobile operators on customer churn through following.

- Telecom companies need to retain their existing consumers if they want to maintain their profitability and beat the competition.
- Customer churn is having a relationship with the profitability of the organization.
- Indian mobile customer churn rate ranges between 3.5 per cent -6 per cent highest in the Asia-Pacific region and generates a loss of more than \$94.03 Cr every year for mobile operators.
- A 5 per cent reduction in customer erosion converts into a 25-25 per cent surge in earnings for the mobile service providers.

Researchers agree and so do mobile operators that consumer churn is one of the main aspects of sustainable competitive gain for mobile operators.

The literature (e.g., Geetha & Lee *et al.*, 2011; Deshpande, 2012; Kumari, 2012; Joshi, 2012; Sharma & Sonwalkar, 2016; Deo, 2017; Amin *et al.*, 2017; Barmana *et al.*, 2018; Zaman, 2018; Lunn & Lyons, 2018; Khandker & Joshi, 2018) on customer churn reveals that consumers are crucial to a company's success, strategies for lowering customer churn must be developed. In the telecom sector, the main cause of customer churn in the telecom sector is price affordability. The need for faster mobile data speed, voice mobile connectivity, or mobile network coverage can all contribute to customer churn in the telecom industry.

2.5.3 Factors Influencing Churn in Telecom

The synthesis of literature available on customer churn (e.g., Lee *et al.*,2001; Anckar & D'incou,2002; Gustafsson *et al.*,2005; Pathak & Rastogi,2007; Ferguson & Brohaugh, 2008; Ali *et al.*,2010;Lee *et al.*, 2011; Singh *et al.*,2011; Shah,2012; Chen & Cheng, 2012; Geetha & Kumari, 2012; Krishna,2013; Sharma & Sonwalkar,2016; Shafei & Tabaa, 2016; Izogo,2017; Confraria *et al.*,2017; Amin *et al.*,2017; Barmana *et al.*,2018; Zaman,2018; Lunn & Lyons, 2018; Khandker & Joshi,2018) available on customer churn reveal:

- There has been a disruptive entry by Reliance Jio into the Indian telecom market which has had a significant impact on Indian mobile customer behaviour. Customer usage has shifted from voice-based usage to data-based usage.
- After the launch of Reliance Jio in the Indian telecom market, data speed has become the most critical influencing factor for churn.
- In telecom customer churn can also happen because of the need for higher mobile data speed, better voice mobile connectivity or better mobile network coverage.
- Price affordability is one of the strongest factors of customer churn in the telecom industry.

The factors influencing customer churn its literature reference are described below:

Social influence plays a critical role while deciding customer brand preference and churn. Social influence is nothing but any alteration in an individual's thoughts, feelings, or behaviour triggered by another person, who may be present or whose presence is fictional, expected, or only implied. Social influence includes the ways in which persons change their behaviour to meet the need of a social atmosphere. It takes numerous forms and can be seen in conformity, socialization, peer pressure, obedience, leadership, persuasion, sales, and marketing (Hejazinia & Kazemi,2014; Gamulin *et al.*,2015).

Literature (e.g., Algesheimer *et al.*,2005; Ferreira *et al.*,2019) reveals that social influence consists of the opinion of friends, family, spouse, colleagues etc. and it has a significant influence on the consumer's choice of service provider (Hejazinia & Kazemi,2014; Gamulin *et al.*,2015; Mahajan & Mahajan,2018). The literature (e.g. Hejazinia & Kazemi,2014; Gamulin *et al.*, 2015) shows that customers getting influenced by social influence when deciding to purchase a new mobile connection or move from one service provider. In the same context study by Mahajan and Mahajan (2017) and Ferreira *et al.* (2019) shows that in today's digital world when people are having access to information on their mobile, they take the opinion of friends and family members, discussed among themselves while making a final decision on churn with the telecom service provider.

Advertising or advertisement is a means of communication with the users of a product or service (Hejazinia & Kazemi,2014; Mahajan & Mahajan,2017). The Advertising Association of the United Kingdom defines advertisements as “messages paid for by those who send them and are intended to inform or influence people who receive them”. In other words, the advertisement is also described as “a public notice particularly: one published in

the press media or broadcast over the air a full-page advertisement for the movie a TV advertisement". There are two mediums of advertisement i.e. traditional advertisement mediums and modern advertisement mediums. Traditional advertisement mediums include communication through newspapers, magazines, television, radio, outdoor advertising, or direct mail. Modern advertisement mediums include search engine results, blogs, social media, websites, and text messages as means of communication. Jasmin (2020) in his study on advertisement impact on webmail services in Germany states that advertising is of great importance to internet service providers. The advertisement has a major influence on the customer churn process but the study reveals that customer prefers the functional enhancement of the product to excess advertisement.

The literature on the telecom industry (e.g., Chakraborty & Sengupta, 2013; Hejazinia & Kazemi, 2014) shows that advertisement can create a positive perception among the customers which can help to increase the retention rate and reduction in customer churn. The advertisement may result in expansion of the market, increased sales, fight competition, enhanced goodwill, education of the consumers, elimination of middlemen, and reduction in customer churn/attrition.

Hejazinia & Kazemi (2014) states that advertisement plays a critical role in brand promotion and influence customer to shift their service or buy new services causing customer churn. The study on the impact of an advertising campaign and customer churn shows that the advertisement can impact customer loyalty and decreases the churn rate.

Network quality is the backbone of the telecommunication industry, research shows that network quality is the key factor while deciding the choice of mobile service provider and a poor matrix of the network quality may result in customer churn (Mahajan & Mahajan, 2017). In a similar line, the study on customer churn in the telecommunication industry by Joshi (2012) and Bhandari (2014) reveals that customer churn increases with poor experience with the network quality.

Literature (e.g. Adebisi *et al.*, 2016; Akmal, 2017; Mahajan & Mahajan, 2017) proposes data speed, voice quality like call drop/voice quality, and coverage as essential attributes of network quality.

Network coverage is nothing but the geographical area in which mobile network service is available. Network coverage plays important role in the Indian current context as India is moving to relatively newer 4G technology. Poor network coverage leads to the non-availability of mobile service to customers (Amin *et al.*, 2017). Curwen (2018) states that data or mobile internet speed is the critical element of network quality which determines

customer loyalty and affects customer churn. In a digital environment, customer dissatisfaction increases with poor data speed network as it affects video streaming, entertainment app, and mobile app performance and may result in losing customers to competition (Kamal, 2018). In India, since 50% of the mobile subscribers are still using the mobile without internet shows that they are purely dependent on the voice connectivity of the mobile service provider, research shows that voice quality is the primary reason for customer churn (Jahanzeb & Jabeen, 2007; Geetha & Kumari, 2012; Chadha & Bhandari, 2014; Akmal, 2017; Khan, 2019).

In the telecommunication industry, service is mainly categorized as network service and functional services. According to Chakraborty and Sengupta (2014), functional services often include services such as sim card exchange services, activation process and documentation processes, and value-added services. Literature (e.g. Liang *et al.*, 2008; Ramar, 2013; Chakraborty & Sengupta, 2014; Mahajan & Mahajan, 2017) reveals that services (both network and functional) play an important role in loyalty-building, subsequently resulting in incremental retention rate and reduction in churn for the organization. Joshi (2012) states that ease of service can drastically reduce the number of agents required for customer service support. In a similar context, Chakraborty and Sengupta (2013) show that, if a customer is easily able to use a product or application with good service, there will be less need to deploy a customer services agent and it also helps to improve the customer experience and influences the customer churn rate, which results in money-saving for the business. According to Akmal (2017), product value is defined as “monetary benefits or more than what is expected by the customer received by the customer”. The value is generally conceptualized as value-added services, tariff or price and a surprise gift to the customer. Product value given to the customer is having a significant role in customer churn. In India after the introduction of 4G data services, customers are looking for more and more value-added services than before, and the requirement for value-added service has shifted from traditional (e.g., a global positioning system (GPS), caller tune, missed call alert) to modern services like over the top (Karanja, 2021). Another study on the product value and churn management process shows that the customer gets delighted by birthday/surprise benefits and it improves customer loyalty, hence this becomes an integral part of the customer churn management process (Ahn *et al.*, 2006; Geetha & Kumari, 2012; Adebisi *et al.*, 2016; Akmal, 2017; Banda & Tembo, 2017; Akmal, 2017). It is important to

note that there is a strong correlation between price and value (Chakraborty & Sengupta, 2013; Adebisi *et al.*,2016; Mahajan & Mahajan,2017; Akmal, 2017).

Customer churn and product value have been studied in different markets, and it is not limited to any specific country, like Korea (Ahn *et al.*,2006), Nigeria (Adebisi *et al.*,2016), Zambia (Banda & Tembo,2017) and India (Mahajan & Mahajan,2017).

Franz Rudolf Esch *et al.* (2006) suggest a relationship between customer churn and brand. Many studies have suggested that an expressive brand image may fabricate more loyal customers which helps to reduce customer churn (Bennett & Thiele, 2005; Nandan, 200; Chitty *et al.*,2007). Moreover, a Brand is a circumlocutory instrument that can positively amend the purchasing behaviour of the customers and it also plays an important role to improve any company's performance (Malik *et al.*,2013). Khan (2012) reveals in his studies that brand significantly impact the customer churn and retention process.

Hoyer and Brown (1990) explained that when the client shows a willingness to obtain a product or service or decides to churn from the product or service, it depends on how he/she remembers the brand (Keller,1993; Franz,2006). It is one of the effective tools with the help of which we estimate how much consumer's inclination regarding a product or service.

The brand becomes an important experience for customer loyalty (Akbar & Parvez; 2009). Moreover, the Brand has a key role to play when making a decision on churn and loyalty by customers (Kussik,2007). Another study shows the brand as having the ability to influence positively the superiority of a product or service (Fouladivand *et al.*,2013). The Brand is not only prejudiced through the behavioural itself, but, by the useful act of the entity (Kressman *et al.*,2006).

The literature (e.g., Moraga *et al.*, 2008; Lisbeth *et al.*,2010; Hollebeek,2011) describes a brand “as a product, service, or concept that is publicly distinguished from other products, services, or concepts so that it can be easily communicated and usually marketed”. In the same line study by Svendsen and Prebensen (2013); Solem (2016) states that a brand is the name of a distinctive product, service, or concept. The term brand in marketing is known as “people identify a particular company, product, or individual”. Brands are ‘intangible’, which means you can't touch or see them, a brand can help to form people's perceptions of organizations, their services, or persons.

The relationship study on brand and customer churn by Joshi (2012), Mahajan and Mahajan (2017) and Stella (2019) show that to win the market, organizations need to have a proper brand approach in place as the brand can influence the customer churn rate. According to Svendsen and Prebensen (2013), brand plays an important role in the customer churn

process, brand trust and brand perception improve customer loyalty hence increasing customer retention and improving the customer churn rate (Moraga *et al.*,2008; Lisbeth *et al.*,2010; Hollebeek,2011; Svendsen &Prebensen,2013; Solem,2016; Mahajan & Mahajan,2017; Stella, 2019).

In all industries, including telecom, the most common reason for customer churn is a competitor's lower price proposal for comparable services. Another cause of client churn is a change in the customer's physical location. Apart from the above in the literature on the telecom industry factors such as social influence, advertisement, service, product value, network quality and brand have also been described as some of the key reasons for customer churn. It is important to highlight that the Indian telecom sector is undergoing a transition phase. The telecom market has changed into a data-driven market. The needs and requirements of customers are evolving. Under such an environment there is an urgent need to reconfirm the reasons for customer churn.

2.6 CUSTOMER ENGAGEMENTS, SATISFACTION, AND CHURN

The study on the relationship between customer engagement, satisfaction, and churn reveals that these are interlinked terminologies and have a positive relationship among them. If the customer is positively engaged with the company, customer churn reduces. Here positive engagement is important as it shows a higher satisfaction level, customer engagement with negative aspects like re-visiting service channels for resolution of the same issue is also engagement, and it may lead to an increase in churn (Mittal & Kamakura, 2001; Hayden, 2019).

A study on customer engagement, satisfaction, and churn by Hayden (2019) shows that customer engagement can change customer repurchase behaviour. Customer engagement through service channels can impact customer satisfaction levels and churn behaviour. Many originations use the net promoter score(NPS) method to calculate the satisfaction level of the customer service touchpoints like call centres, webchat, and stores. The study further shows that customer engagement satisfaction and loyalty is having a positive relationship between them.

Gerpott and colleagues (2001) have differentiated the construct of satisfaction, loyalty & retention. According to them, these constructs are positively related to each other. Customer satisfaction drives loyalty and influences retention. Another similar relationship study on customer satisfaction and churn behaviour in Korean country by Kim *et al.* (2004)

shows that cellular mobile network call quality is the most important concern and impacts the satisfaction of mobile customers. Satisfaction has a significant impact on consumer loyalty and churn.

Anderson and Sullivan (1993) reveal that customer satisfaction is dependent on the kind of services that the telecom company offers with different service channels. The more is the association with the company; the more benefits the customers can avail themselves. At the same time, since there is not much switching cost involved, the customer may deflect with the slightest sense of dissatisfaction. A satisfied customer, on the contrary, would never make noise, which is as well not beneficial to the company. This implies that it is better to have satisfied customers who might not necessarily multiply the customer base but would at least be contented with the services that they avail from the current company than to have a dissatisfied customer who would deflect and spread a negative word of mouth publicity of the company, just because his experience with a particular service provider was not fruitful. The study concedes that customer engagement and satisfaction churn is having a positive relationship.

The study made by different researchers (e.g. Ahn *et al.*,2006; Lisbeth *et al.*,2010; Hollebeek,2011; Geetha & Kumari,2012; Svendsen & Prebensen,2013; Solem,2016; Adebisi *et al.*, 2016; Akmal,2017; Banda & Tembo, 2017; Akmal,2017) on customer engagement, satisfaction, and churn relationship shows that engagement is the cause, satisfaction is the effect and churn is the business measurable outcome for the business hence all three terminologies are very important for the business and are distinct. Consumer engagement typically happens in the initial phase of the consumer life span. Consumer satisfaction occurs as an outcome of customer engagement. It's vital to take both matrixes into count while gauging any marketing campaign. A professional preferably is repeatedly looking for a response to increase customer satisfaction (Bowden,2009; Ali *et al.*,2010; Hayden,2019).

2.7 RESEARCH GAP

From the above discussion, it's visible that customer engagement, satisfaction, and churn are very significant to the mobile service provider and their importance is increasing. Many studies (e.g. Wei *et al.*,2002; Moraga *et al.*,2008; Lisbeth *et al.*,2010; Hollebeek,2011; Geetha & Lee *et al.*,2011; Deshpande, 2012; Kumari,2012; Joshi,2012; Svendsen &

Prebensen,2013; Solem,2016; Sharma & Sonwalkar,2016; Mahajan & Mahajan,2017; Deo,2017; Stella, 2019) find a significant positive relationship between customer engagement, satisfaction, churn, and business performance. A high positive degree of customer engagement and satisfaction is always desirable in the service industry.

The research by leading research firm Mckinsey (2017) on incremental digital customer engagement and its relative impact on satisfaction, reveals that customers engaging with the digital channels are more satisfied than a customer engaging in the non-digital (traditional) service channels but the penetration of digital channel is lower than the traditional service channels. Hence to find the reason for lower penetration of digital service channels as a first step need to find the satisfaction level for transaction customer engagement channels and factors affecting customer engagement, so that company can design the customer engagement strategy better way.

Researchers have agreed that there is a scope of research on customer satisfaction in today's digital world in the Indian telecommunication environment. Satisfaction is also influenced by changes in technology, social ecosystem, and economic condition (Singh, 2017). The mobile usage pattern of Indian mobile customers is undergoing a large-scale transition. At present, voice usage has become unlimited and free and data usage growth is exponential. The Indian telecom industry is stressing more digital engagement, a higher degree of customer satisfaction, and a reduction in customer churn. The literature (e.g. Husted, 2000; Muhammad Akmal,2017) reveals that the change in technology and the degree of social advancement impact customer behaviour, satisfaction, and churn reason. Hence in today's environment, there is a need to re-examine the factors responsible for customer engagement, satisfaction, and churn. However, the literature study shows that there are not many studies exploring customer engagement, satisfaction, and churn in the Indian new environment. Further, there is barely any study conducted for exploring the relationship between customer engagement and satisfaction in the Indian context.

The studies till now were done by collecting the data in and around the academic area the samples were collected from particular cities or states.

The present study is an effort to fill these gaps.

2.8 PROPOSED CONTRIBUTION OF THE STUDY

This study may help the academicians, managerial personnel engaged in the Indian Telecom sector, and government agencies in the following ways,

- The research can be used by the managers to plan the customer engagement strategy with the different service engagement channels.
- The research outcome will identify the influencing factors on customer satisfaction and churn thereby helping customer retention through repeat acquisition.
- The study will assist mobile companies to know the reason for customer satisfaction and how customer engagement is affecting customer satisfaction.
- The study can be used in the new digital world to improve customer satisfaction and understand the importance of the digital service channel, which can be further helpful to design the service channel strategy for mobile service companies.
- This research can help to understand the demographic effect on customer engagement and satisfaction that can help an organization to build a strategy to drive more revenue for the company.
- The research will help in understanding customer engagement, satisfaction, and how customers can be retained.
- Mobile customer retention is a key part of the churn management strategy for a mobile service provider, the study will benefit mobile companies to manage churn as this study shared the factors affecting customer churn.
- This research can help mobile service companies to form loyalty programs and run them through various service channels.

CHAPTER III

RESEARCH METHODOLOGY

This chapter describes the research methodology adopted for the present study. The first section defines the research design and provides objectives, hypotheses, conceptual model and the scope of the study. The next section explains the conceptualization and operationalization of constructs under investigation i.e., customer engagement, satisfaction and churn. The last section presents the sample design, process of survey execution, data analysis techniques and limitations of the study.

3.1 RESEARCH DESIGN

A descriptive research design has been adopted for the conduct of the present study. Further, the study is cross-sectional in nature where data has been collected from the respondents at a particular point in time.

3.1.1 Research Topic

Customer Engagement, Satisfaction and Churn: A Study of Indian Telecom Sector

3.1.2 Research Objectives

- To identify the various attributes of customer engagement.
- To study the various determinants of customer satisfaction and their relative importance.
- To assess the association of customer demographic with customer engagement and customer satisfaction.
- To study the relationship between customer engagement and customer satisfaction.
- To assess the relevance of various parameters in describing customer churn.

3.1.3 Hypotheses

The hypotheses tested for this research are as below

H₀1: There is no significant association between customer demographics and customer engagement.

- H₀1a: There is no significant association of gender with customer engagement.
- H₀1b: There is no significant association of age with customer engagement.
- H₀1c: There is no significant association of education with customer engagement.
- H₀1d: There is no significant association of occupation with customer engagement.

Ho2: There is no significant association between customer demographics and customer satisfaction.

- H_o2a: There is no significant association of gender with satisfaction.
- H_o2b: There is no significant association of age with customer satisfaction.
- H_o2c: There is no significant association of education with customer satisfaction.
- H_o2d: There is no significant association of occupation with customer satisfaction.

H_o3: There is no significant association of customer engagement on satisfaction.

3.1.4 Conceptual Model

The conceptual model of the proposed study is shown in Figure 3.1.

Model:

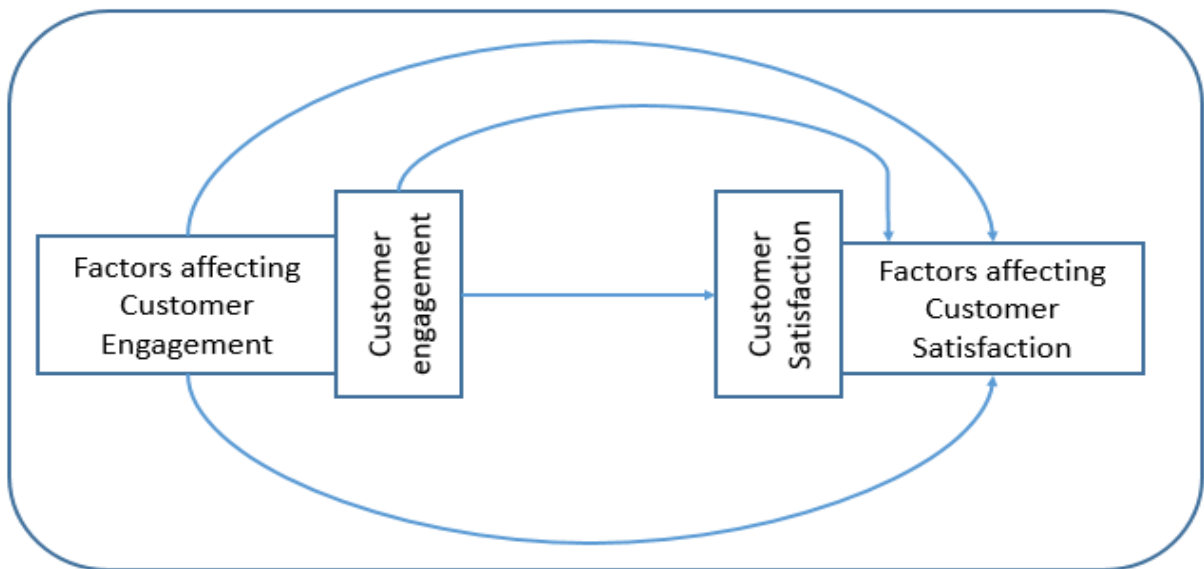


Figure no. 3.1 Conceptual Model

3.1.5 Scope of Study

The study is restricted to prepaid customers in India with mobile operators Vodafone Idea, Airtel, Jio and BSNL.

3.2 VARIABLES AND MEASURES

The following procedure has been adopted for the conceptualization and operationalization of the constructs under investigation. A reflective measurement theory has been proposed for the operationalization of the constructs under investigation.

3.2.1 Construct Specification

Construct description is a prerequisite for scale development (Churchill, 1979; Rico *et al.*, 2012). A definition of the construct can be a broad-based concept or topic, what is to be included, what is to be omitted and the context, in which it is to be realistic and it improves the research findings. For the operationalization, the different construct has been defined as follows

3.2.1.1 Customer Engagement (CE)

The CX dictionary defines Customer Engagement (CE) as “the interaction or communication that takes place between your consumers and your company or brand”. This interaction can take place with the help of customer engagement channels.

3.2.1.2 Customer Satisfaction

American Society for Quality defines Customer satisfaction as “a measurement that determines how happy customers are with a company's products, services, and capabilities”. The study shows that customer satisfaction information, like surveys and ratings, can help an organization to conclude how to get better or modify its procedure, services and products.

3.2.1.3 Customer Churn

The customer churn rate is also known as “the rate of attrition”. In other words, customer churn is defined by Reichheld and Sasser (1990) as “the rate at which customers stop doing business with an entity”. It is most usually presented as the percentage of service customers who discontinue their services for a particular timeframe.

3.2.2 Generation of Item Pool and Selection of Sample of Items

At this phase of scale development, the pool of items was generated for the selection of the sample of items. Items on customer engagement, satisfaction, and churn were identified from the literature. All these items were screened out for indistinctness (judgment on the chances that the item can be interpreted in dissimilar ways), redundancy (the extent to which an item overlaps with some items capturing the same construct), clarity (the item is accurate/direct), relevance (appropriateness of an item in measuring the underlying concept) and adequacy (the extent to which an item covers the underlying concept). This process resulted in items being finally selected for the instrument.

3.2.2.1 Operationalization of Customer Engagement Construct

Customer engagement (CE) is referred to as customer visits to the service channels or company/product. The more the frequency of visits, the customer is referred to as more engaged with that company or product.

3.2.2.1.1 Attributes of Customer Engagement

Based upon the systematic literature review eighteen attributes of customer engagement have been identified and statements specified in Table no. 3.1 has been formulated for the purpose of operationalization. These statements have also been given to industry experts for validation.

Table no. 3.1: Items for Measuring Customer Engagement

Sr. No	Attributes	Statements	Source / Literature reference
1	Call centre	I frequently call customer care (call centre) for my inquiries.	Jaiswal,2008
2	Multiple Brand Stores	I regularly visit the multibrand outlet for the resolution of my issues with my service provider.	Chopra ,2014; Hameli ,2018; Bascur <i>et al.</i> ,2020.
3	Retail Outlet	I regularly visit a retailer for the resolution of my problems.	Chopra ,2014; Bascur & Rusu ,2020
4	Written Mode	I regularly connect with written letter mode with my service provider.	Breuer <i>et al.</i> ,2020
5	Franchisee Owned Stores (FOCO)	I regularly visit the franchisee store for exclusive service.	Chopra ,2014; Ramaseshan <i>et al.</i> ,2017; Mainardes <i>et al.</i> ,2019
6	Company-Owned stores (COCO)	I interact with exclusive company store outlets for my all network and offer related issues.	Chopra ,2014; Breuer <i>et al.</i> ,2020; Bascur & Rusu ,2020
7	Call-Back	I regularly use call back service for my service queries.	Elliott ,2019; Soluno ,2020
8	Mobile App	I regularly use a service provider mobile app for issues with my service provider.	Dinner <i>et al.</i> ,2015; Breuer <i>et al.</i> ,2020

9	WhatsApp	I regularly use WhatsApp communication for my issue resolution with my service provider.	Kumar & Sharma ,2017; Comeche & Ruthven ,2021
10	SMS	I use SMS service to search best offers or services.	Lai,2004; Breuer <i>et al.</i> ,2020
11	Webchat	I regularly use web chat for my queries with my mobile service providers.	Frimpong, 2017; Mclean & Breuer <i>et al.</i> , 2020
12	USSD	I use USSD (*123#, *199#, etc.) to know the best offers.	Berg (2015)
13	Email	I regularly write emails for my issues to the mobile service providers.	Doorn <i>et al.</i> ,2010 ; Breuer <i>et al.</i> , 2020
14	Interactive Voice Response (IVR)	I use the interactive voice response (IVR) e.g., 1991 service for my best offers.	Buesing <i>et al.</i> ,2019; Abide & Zuhail, 2019
15	Company Website	I use the company website of the service provider for various mobile services (recharge, offer, activation/deactivation of services).	Connell <i>et al.</i> , 2019; Breuer <i>et al.</i> , 2020
16	Third-party APP	I regularly use a third party (Paytm, phone pay etc.)mobile app for recharge purposes.	Gupta & Singh,2017; Breuer <i>et al.</i> 2020
17	Chatbot	I regularly connect with the chatbot (automated response-based chat) for my queries about my mobile number.	McLean & Osei-Frimpong,2017; Breuer <i>et al.</i> ,2020; Robyn,2020
18	Social Media	I frequently use the service provider's social media platform for offers/schemes.	Peltier <i>et al.</i> , 2016; Kohlmeyer ,2017; Appel <i>et al.</i> , 2019; Robyn ,2020

3.2.2.2 Operationalization of Customer Satisfaction Construct

Philip Kotler (2000) describes customer satisfaction as a “person's feeling of pleasure or disappointment, which resulted from comparing a product's perceived performance or outcome against his/her expectations”. According to Fornell *et al.* (1996), customer

satisfaction is also defined as “an overall evaluation based on the total purchase and consumption experience with the good or service over time”.

3.2.2.2.1 Attributes of Customer Satisfaction

Based upon the systematic literature review attributes of customer satisfaction have been identified and specified in Table no. 3.2. These statements have also been given to industry experts for validation.

Table no. 3.2 Items for Measuring Customer Satisfaction

Sr. no.	Attributes	Statements	Source / Literature reference
1	Over The Top (OTT)	I feel satisfied with the OTT benefits given by the service provider frequently.	Joshi <i>et al.</i> ,2015; Briganty,2019; Mitter,2019
2	Communication	I feel that my service provider communicates promotional offers.	Joshi ,2012;Diegmann <i>et al.</i> , 2017; Kate ,2020
3	Product Tariff	I feel that the tariff plans offered by my service operator are economical	Bolton <i>et al.</i> , 2003;Haque <i>et al.</i> , 2007; Moraga <i>et al.</i> , 2008; Wang <i>et al.</i> , 2013; Akroush <i>et al.</i> , 2015
4	Product Tariff	I feel that my service provider has a wide variety of tariff plans to satisfy a different set of consumers.	Bolton <i>et al.</i> , 2003; Haque <i>et al.</i> , 2007; Moraga <i>et al.</i> 2008; Wang <i>et al.</i> , 2013; Akroush <i>et al.</i> , 2015
5	Product Tariff	I feel that the tariff plans offered by my service operator provide value for money.	Bolton <i>et al.</i> , 2003;Haque <i>et al.</i> , 2007; Moraga <i>et al.</i> , 2008; Wang <i>et al.</i> , 2013; Akroush <i>et al.</i> , 2015
6	Value-Added Services (VAS)	My service provider gives enough options for value-added services.	Das, 2014 ;Rahman, 2014; Joshi, 2015; Saha <i>et al.</i> , 2016; Misra <i>et al.</i> , 2017
7	Goodwill	I feel happy with the surprise gift on	Kim <i>et al.</i> ,2004; Bhat, 2012

	Gesture	various occasions from my service provider.	
8	Promise Fulfillment	My service provider fulfils all its promises.	Bitner, 2001; Angelova & Zekiri ,2011
9	Customer Engagement Activity	My service provider does enough engagement activities at service centres.	Thakur,2019; Sharma & Singh,2021
10	Solving Customer Issues	My service provider is sincere to solve customer issues.	Blanton, 2016; Thakur, 2019
11	Response	I get a prompt response from the customer service agent of my service provider.	Akroush <i>et al.</i> , 2015; Blanton, 2016; Thakur, 2019
12	First Time Right	My complaint or request is getting resolved in the first time by the service provider.	Angelova & Zekiri ,2011; Chandar <i>et al.</i> ,2002
13	Billing Accuracy	My service provider's billing methods are transparent and simple.	Chakraborty & Sengupta ,2014; Kim 2017; Munyanti <i>et al.</i> , 2018
14	Delight	I feel satisfied with the services of my service provider.	
15	Delight	I feel good using my mobile network provider.	
16	Delight	The service provider always meets my needs and I am happy with my provider.	Cronin & Taylor,1992;Oliver ,1997; Kim <i>et al.</i> , 2004;Shin &Kim ,2008
17	Voice Coverage	I have to switch places/walk to get clearer reception of the network.	Leelakulthanit & Hongcharu ,2011; Sandhu <i>et al.</i> , 2013; Rahman, 2014
18	Call Drop	Many times, my conversation is getting disconnected because of a call drop.	Eljaam, 2005; Suchy, 2013; Chakraborty & Sengupta, 2014; Lema. 2020
19	Video	I can watch HD movies on my mobile	Qiu & Cui ,2011; Shankar

	Buffering/Streaming Experience	without video buffering during travelling.	,2019
20	Online Gaming Experience	I can play seamless online games on my mobile.	Narayan,2021
21	Mobile Network Data Coverage	I like to see web series on mobile during my travel.	Chakraborty & Sengupta, 2014; Rahman, 2014; Saleh <i>et al.</i> , 2015; Saha <i>et al.</i> 2016
22	Mobile Network Data Coverage	I get seamless data coverage during roaming.	
23	Voice Quality	My present services have voice clarity and clear signal.	Woo & Fock, 1999; Kim & Yoon, 2004; Chakraborty & Sengupta, 2014; Rahman, 2014
24	Network Busy or Call Congestion	I sometimes have to dial twice or thrice to complete a call.	Sandhu <i>et al.</i> , 2013; Rahman 2014
25	Network Busy or Call Congestion	I rarely get the message “network busy” after dialling a number.	
26	SMS Service	I regularly use SMS services for my communication	Kankam & Sarpong, 2014
27	New Technology Products	My service provider provides the latest technology services to customers.	Husted, 2000; Moraga <i>et al.</i> , 2008; Akroush <i>et al.</i> , 2015
28	New Product Information	My service provider regularly communicates about new product information to customers.	Witell <i>et al.</i> , 2014
29	Documentation Process	The documentation process at the store for my last transaction was hassle-free.	Joshi,2012
30	Service	I have rarely lodged a complaint or	Hess <i>et al.</i> ,2003;

	Consistency	called customer care.	Angelova & Zekiri,2011
31	Attentive Service Executive	The customer service agent of my service provider is attentive to the problem.	Booms & Bitner,1981; Bitner <i>et al.</i> , 1990; Price <i>et al.</i> ,1995; Berry & Parasuraman,1996; Blanton,2016; Zhao <i>et al.</i> ,2018; Liu <i>et al.</i> ,2019
32	Willingness of Agent	My service provider is always willing to help.	Price <i>et al.</i> ,1995; Blanton (2016)
33	Service Availability	My service provider conveys service working hours to customers.	Chaudhary, 2012
34	Service Capability	My service provider is capable to understand customer problems.	Joshi, 2012; Blanton, 2016
35	Store Ambience	I feel happy after looking at the neatness and cleanliness of the store.	Broadbent,2020
36	Security Concern	I don't have to worry about any security issues while doing a transaction with my service provider.	Peikari,2010; Girsang, 2020
37	Skill and Knowledge	My service provider is having the skills and knowledge to resolve customer queries.	Joshi, 2012; Blanton, 2016
38	Empathy	My service provider apologises for the inconvenience caused to customers.	Bloemer <i>et al.</i> , 1999; Al Hawari <i>et al.</i> , 2009; Gulycz, 2010; Blanton, 2016

3.2.2.3 Operationalization of Customer Churn Construct

Customer churn is defined as “customer attrition when a customer closes his or her association with a company or service”. Online businesses normally described a customer churned once a specific amount of time has lapsed since the consumer’s last interaction with the service provider.

3.2.2.3.1 Attributes of Customer Churn

The items for the operationalization of customer churn were sourced from the literature. The items were then given to industry experts for validation.

Table no. 3.3: Items for Measuring Customer Churn

Sr. No	Attribute	Statements	Source / Literature reference
1	Social Influence	My corporate plays a significant role while deciding my operator during the MNP process.	Hejazinia & Kazemi ,2014; Gamulin <i>et al.</i> ,2015; Mahajan & Mahajan ,2017 ; Ferreira <i>et al.</i> ,2019
2	Social Influence	I prefer all the members of my family must use the services of the same provider.	
3	Social Influence	My office colleagues play an important role in my choice of the service operator.	
4	Advertisement	My current service provider has the best promotional campaigns (e.g., product advertisement); hence I am using a mobile connection.	Joshi,2012; Chakraborty & Sengupta ,2013; Hejazinia & Kazemi ,2014
5	Advertisement	I have been sticking with my current provider because it has the best advertisements.	
6	Advertisement	My decision to select/switching of my service provider is influenced by the advertising campaign of the service providers.	
7	Service	I feel as people don't like to retain their number with the service provider which has a complex and inconvenient SIM exchange process.	Joshi, 2012; Chakraborty & Sengupta ,2013; Mahajan & Mahajan ,2017
8	Service	I feel as people generally avoid those operators who have a cumbersome documentation process.	
9	Service	I feel as the complexities in the activation process of value-added services are a major reason for MNP.	
10	Product Value	I feel as people generally prefer to go for those operators who offer a vast variety of value-added services.	Ahn <i>et al.</i> ,2006; Joshi ,2012; Chakraborty & Sengupta,2013; Adebisi <i>et al.</i> ,2016;
11	Product Value	I feel as the tariff is a deciding factor for a customer while deciding with regard to the	

		selection/switching of the operator.	Mahajan & Mahajan,2017;
12	Product Value	I feel as birthday gifts /surprise benefits may help a firm to reduce customer churn propensity.	Akmal,2017
13	Network Quality	In my opinion network, data speed and quality impact customer churn.	Joshi ,2012; Chadha & Bhandari ,2014;
14	Network Quality	I feel as network coverage plays a significant role while deciding/switching service providers.	Adebiyi <i>et al.</i> ,2016;
15	Network Quality	I feel as the quality of voice calls plays a significant role while deciding/switching service providers.	Mahajan & Mahajan,2017;
16	Brand	I feel as trust of the public in the brand may influence customer's decisions while deciding/switching service providers.	Akmal,2017
17	Brand	I feel as the brand is an important influencing factor for customer churn.	Moraga <i>et al.</i> ,2008; Lisbeth <i>et al.</i> , 2010; Hollebeek ,2011;
18	Brand	In my opinion, people look at the quality brand while taking decisions on MNP.	Prebensen ,2013; Solem ,2016; 2012;
			Mahajan & Mahajan ,2017; Stella ,2019

3.2.3 Scaling

Scaling is a process of allocating numbers to items, which denotes the respondent's response to a specified phenomenon in a given range. The type of scaling required for an instrument depends on how complex a construct is. For a more complex construct, the scale is required with multiple categories. To capture the presence or absence of an attribute among the population or sample, the dichotomous response category may satisfy the requirement. In the context of the present study, dichotomous scaling techniques such as 'agree or disagree', were not sufficient to capture the variability of the underlying construct. So, for the adequate measurement of the different constructs of interest, a seven-point, Likert-type scale has been used.

Reason for Seven-Point Likert- type

- It reduces “frustration level”, “improves response rate” and “response quality” (Babakus & Mangold, 1992).

- The scale ranging from 'strongly agree' to 'strongly disagree' was deployed as it has been most suggested by the researchers and increased response quality (Sachdev & Verma, 2004).
- The seven-point scale delivers more diversity of options which in turn increases the probability of meeting the objective genuineness of respondents.

3.2.4 Content Validation and Testing

The content validity of the scale has been examined by seeking the opinion of five academic experts and five Industry experts. The reviewers were connected individually in person and requested to share their inputs on the relevance, representativeness and comprehensiveness of the items sampled. Some minor changes regarding the phrasing of a few items were suggested by some of the reviewers, which were incorporated before finalization. The same is represented as a response in the below tables (Table no. 3.4, 3.5 and 3.6). The final operationalization of the various constructs has been presented below

Table no. 3.4: Items Selected for Measuring Customer Engagement

Sr. No	Code	Statements
1	E1	I frequently call customer care (call centre) for my inquiries.
2	E2	I regularly visit the multibrand outlet for the resolution of my issues with my service provider. Response: what is the meaning of multibrand? Pls add example Final statement: I regularly visit the multibrand outlet (selling products of all mobile service providers) for the resolution of my issues with my service provider.
3	E3	I regularly visit a retailer for the resolution of my problems.
4	E4	I regularly connect with written letter mode with my service provider.
5	E5	I regularly visit the franchisee store for exclusive service.
6	E6	I interact with exclusive company store outlets for my all network and offer related issues.
7	E7	I regularly use call back service for my service queries.

8	E8	I regularly use a service provider mobile app for issues with my service provider.
9	E9	I regularly use WhatsApp communication for my issue resolution with my service provider.
10	E10	I use SMS service to search best offers or services.
11	E11	I regularly use web chat for my queries with my mobile service provider.
12	E12	I use USSD (*123#, *199#, etc.) to know the best offers.
13	E13	I regularly write emails for my issues to the mobile service providers.
14	E14	I use the interactive voice response (IVR) e.g., 1991 service for my best offers.
15	E15	I use the company website of the service provider for various mobile services (recharge, offer, activation/deactivation of services).
16	E16	I regularly use a third party (Paytm, Phone pay etc.) mobile app for recharge purposes.
17	E17	I regularly connect with the chatbot for my queries about my mobile number. Response: unable to understand the meaning of chatbot. Pls elaborate Final statement: I regularly connect with the chatbot (automated machine-based chat) for my queries about my mobile number.
18	E18	I frequently use the service provider's social media platform for offers/schemes. Response: unable to understand social media here pls add examples Final statements: I frequently use the service provider's social media (e.g., Facebook, YouTube, LinkedIn etc.) platform for offers/schemes.

Table no. 3.5: Items Selected for Measuring Customer Satisfaction

Sr. no.	Code	Statements
1	S1	I use OTT benefits given by the service provider frequently. Response: what is OTT? Final statement: I feel satisfied with the OTT (Over the TOP e.g., ZEE5, Netflix, Amazon prime etc.) benefits given by the service provider frequently.
2	S2	I feel that my service provider communicates promotional offers.
3	S3	I feel that the tariff plans offered by my service operator are economical.
4	S4	I feel that my service provider has a wide variety of tariff plans to satisfy a different set of consumers.
5	S5	I feel that the tariff plans offered by my service operator provide value for money.
6	S6	My service provider gives enough options for value-added services. Response: what are value-added services? Final statement: My service provider gives enough options for value-added services (e.g., caller tune, missed call alerts etc.).
7	S7	I feel happy with the surprise gift on various occasions from my service provider.
8	S8	My service provider fulfils all its promises.
9	S9	My service provider does enough engagement activities at service centres Response: what are engagement activities? Final Statement: My service provider does enough engagement activities (e.g., service camps, customer education programmes etc.) at service centres.
10	S10	My service provider is sincere to solve customer issues.
11	S11	I get a prompt response from the customer service agent of my service provider.
12	S12	My complaint or request is getting resolved in the first time by the service provider.
13	S13	My service provider's billing methods are transparent and simple.
14	S14	I feel satisfied with the services of my service provider.
15	S15	I feel good using my mobile network provider.

16	S16	The service provider always meets my needs and I am happy with my provider.
17	S17	I have to switch places/walk to get clearer reception of the network.
18	S18	Many times, my conversation is getting disconnected because of a call drop.
19	S19	I can watch HD movies on my mobile without video buffering during travelling.
20	S20	I can play seamless online games on my mobile.
21	S21	I like to see web series on mobile during my travel.
22	S22	I get seamless data coverage during roaming.
23	S23	My present services have voice clarity and clear signal.
24	S24	I sometimes have to dial twice or thrice to complete a call.
25	S25	I rarely get the message “network busy” after dialling a number.
26	S26	I regularly use SMS services for my communication. Response: The question is not clear. Final statement: I regularly use SMS services for my communication without any issue.
27	S27	My service provider provides the latest technology services to customers.
28	S28	My service provider regularly communicates about new product information to customers.
29	S29	The documentation process at the store for my last transaction was hassle-free.
30	S30	I have rarely lodged a complaint or called customer care.
31	S31	The customer service agent of my service provider is attentive to the problem.
32	S32	My service provider is always willing to help.
33	S33	My service provider conveys service working hours to customers.
34	S34	My service provider is capable to understand customer problems.
35	S35	I feel happy after looking at the neatness and cleanliness of the store.
36	S36	I don't have to worry about any security issues while doing a transaction with my service provider.
37	S37	My service provider is having the skills and knowledge to resolve customer queries.
38	S38	My service provider apologises for the inconvenience caused to customers.

Table no. 3.6: Items Selected for Measuring Customer Churn

Sr. No	Code	Statements
1	CF1	My corporate plays a significant role while deciding my operator during the MNP process.
2	CF2	I prefer all the members of my family must use the services of the same mobile service provider.
3	CF3	My office colleagues play an important role in my choice of service operator.
4	CA1	My current service provider has the best promotional campaigns; hence I am using a mobile connection. Response: what is a promotional campaign? Final statement: My current service provider has the best promotional campaigns (e.g., product advertisement); hence I am using a mobile connection.
5	CA2	I have been sticking with my current provider because it has the best advertisements.
6	CA3	My decision to select/switching of my service provider is influenced by the advertising campaign of the service providers.
7	CE1	People don't like to retain their number with the service provider which has a complex and inconvenient SIM exchange process. Response: Biased question Final statement: I feel as People don't like to retain their number with the service provider which has a complex and inconvenient SIM exchange process.
8	CE2	People generally avoid those operators who have a cumbersome documentation process Response: Biased question Final statement: I feel as People generally avoid those operators who have a cumbersome documentation process.
9	CE3	The complexities in the activation process of value-added services are a major reason for MNP. Response: what are value-added services? Need to add activation fault in service

		The final statement: I feel as the complexities in the activation process of value-added services (e.g., caller tune, roaming, data pack etc.) are a major reason for MNP.
10	CV1	People generally prefer to go for those operators who offer a vast variety of value-added services. Response: what are value-added services? Final statement: I feel as people generally prefer to go for those operators who offer a vast variety of value-added services. (e.g., caller tune, roaming, data pack etc.).
11	CV2	I feel as the tariff is a deciding factor for a customer while deciding with regard to the selection/switching of the operator.
12	CV3	Birthday gifts /surprise benefits may help a firm to reduce customer churn propensity. Response: what is meant by churn propensity? Final statement: I feel as Birthday gifts /surprise benefits may help a firm to reduce customer churn propensity (intensity).
13	CN1	In my opinion network, data speed and quality impact customer churn.
14	CN2	I feel as network coverage plays a significant role while deciding/switching service providers.
15	CN3	I feel as the quality of voice calls plays a significant role while deciding/switching service providers.
16	CB1	I feel as trust of the public in the brand may influence customer's decisions while deciding/switching service providers.
17	CB2	I feel as the brand is an important influencing factor for customer churn.
18	CB3	In my opinion, people look at the quality brand while taking decisions on MNP.

3.3 SAMPLE DESIGN

3.3.1 Sampling

As per Beri (2008), the sample is described as “a part of the population, which is provided by deliberate selection with the object of investigating the properties of the parent population”. Sampling can be defined as “the intentional choice of several people, the sample, who are to provide you with the data from which you will draw inferences about some larger group, the

population, whom these people represent” (Jankowicz,1995). The sampling procedure contains the below steps (Tull *et al.*,1984).

3.3.2 Sample size

Sample size finalization can be completed by two approaches “Practical Approach” or “Statistical Approach” (Beri 2008). As per Costello, and Osborne (2005) the best approach to finalizing the sample size for factor analysis is subject to item ratio. Costello and Osborne state that, “a large number of researcher’s report show factor analysis using comparatively small samples. In a few of the studies in our survey, researchers conducted analyses with a subject to item ratio of 10:1 or less, which is a rule of thumb by many researchers use for determining sample size”.

Table no. 3.7: Sample Size In Factor Analysis

Subject to Item ration	Percentage of studied	Cumulative percentage
2:1 or less	14.70%	14.70%
> 2:1 to 5:1	25.80%	40.50%
>5:1 to 10:1	22.70%	63.20%
>10:1 to 20:1	15.40%	78.60%
>20:1 to 100:1	18.40%	97.00%
>100:1	3%	100.00%

Reference: Costello and Osborne, 2005

In this research, data is gathered from 1600 customers for analysis. At a subject size of 1600 for a maximum of 18 (engagement), 38 (satisfaction), and 18 (churn) attributes under study, the subject to item ratio comes as 18:1, 38:1 and 18:1 so as per above Table no.3.7, the study can be concluded with a 1600 sample size.

In another method of sample calculation by research advisor sampling table -2006 (Figure no. 3.2) if the size of the population is > 100,000,000 then the sample size should be 1537 with a confidence level of 95 per cent and a margin of error of 2.5%. In the present study, the sample taken was 1600 customers so wherein the population is >100,000,000 then a sample size of even 1537 is justified hence the sample size of 1600 considered for this study stands justified.

Research has shown that satisfactory sample size is partially confirmed by the nature of the data (Fabrigar *et al.*,1999). The stronger the data, the smaller the sample can be taken

for analysis. “Strong Data” in factor analysis means uniformly high communalities without cross-loadings, plus several variables loading strongly on each factor.

The sample size must be sufficiently large so that we can have a representative sample. But limited funds and time tend to limit the sample. The population addressed in this research consists of the Indian telecom sector. The sample size is determined with the help of Cochran’s equation, which he developed to yield a representative sample for proportions. Since there is a large population, we do not know the variability in the population that are using a mobile phone; therefore, assuming $p=0.5$ (maximum variability) at a 95% confidence level and + 4.5% precision (Malhotra & Dash,2010).

$$\text{Sample Size Determination} = Z^2pq / e^2$$

Where $z = 1.96$ (95% confidence), $p= 0.5$ (maximum variability), $e= 0.045$ (4.5%) and sample size determination = $(1.96*1.96) *0.5*0.5/ (0.045*0.045) = 474$.

For getting a 5% level of significance size of 474 respondents is considered a representative sample. As in this research, we collected data from 1600 respondents across the above condition on sample size is getting fulfilled.

Required Sample Size†								
Population Size	Confidence = 95%				Confidence = 99%			
	Margin of Error				Margin of Error			
	5.0%	3.5%	2.5%	1.0%	5.0%	3.5%	2.5%	1.0%
10	10	10	10	10	10	10	10	10
20	19	20	20	20	19	20	20	20
30	28	29	29	30	29	29	30	30
50	44	47	48	50	47	48	49	50
75	63	69	72	74	67	71	73	75
100	80	89	94	99	87	93	96	99
150	108	126	137	148	122	135	142	149
200	132	160	177	196	154	174	186	198
250	152	190	215	244	182	211	229	246
300	169	217	251	291	207	246	270	295
400	196	265	318	384	250	309	348	391
500	217	306	377	475	285	365	421	485
600	234	340	432	565	315	416	490	579
700	248	370	481	653	341	462	554	672
800	260	396	526	739	363	503	615	763
1,000	278	440	606	906	399	575	727	943
1,200	291	474	674	1067	427	636	827	1119
1,500	306	515	759	1297	460	712	959	1376
2,000	322	563	869	1655	498	808	1141	1785
2,500	333	597	952	1984	524	879	1288	2173
3,500	346	641	1068	2565	558	977	1510	2890
5,000	357	678	1176	3288	586	1066	1734	3842
7,500	365	710	1275	4211	610	1147	1960	5165
10,000	370	727	1332	4899	622	1193	2098	6239
25,000	378	760	1448	6939	646	1285	2399	9972
50,000	381	772	1491	8056	655	1318	2520	12455
75,000	382	776	1506	8514	658	1330	2563	13583
100,000	383	778	1513	8762	659	1336	2585	14227
250,000	384	782	1527	9248	662	1347	2626	15555
500,000	384	783	1532	9423	663	1350	2640	16055
1,000,000	384	783	1534	9512	663	1352	2647	16317
2,500,000	384	784	1536	9567	663	1353	2651	16478
10,000,000	384	784	1536	9594	663	1354	2653	16560
100,000,000	384	784	1537	9603	663	1354	2654	16584
300,000,000	384	784	1537	9603	663	1354	2654	16586

† Copyright, The Research Advisors (2006). All rights reserved.

Figure no.: 3.2 Sample Size Table

Source: The Research Advisors (2006) (<https://www.research-advisors.com/tools/SampleSize.htm>)

3.3.3 Sample Profile

The scope of the study is limited to prepaid global systems for mobile communications (GSM) customers of Indian states.

It was tough to classify the sampling frame. Like other studies where a phone reference book or a map can be the sampling frame, in this study the sampling frame was unclear as customers can be placed in entire India. So, the country was divided into different areas (east, west, north and south) and the sample was taken from each area/zone. It is tough to undertake a probability sampling design as the customer is spread across India. So purposive sampling with quotas based on areas was preferred over probability sampling.

Table no. 3.8 and 3.9 presents the circle and area-wise % of mobile subscribers.

Table no. 3.8: Mobile Subscribers as on 30th April 2020

Area	Circle	Mobile Subscribers	Mobile Connections % Contribution to Total Subscriber Base
South	Andhra Pradesh	87,141,538	7.6%
East	Assam	23,526,735	2.0%
East	Bihar	83,476,222	7.3%
North	Delhi	52,860,178	4.6%
West	Gujarat	66,816,463	5.8%
North	Haryana	27,479,553	2.4%
North	Himachal Pradesh	10,745,879	0.9%
North	J & K	11,822,044	1.0%
South	Karnataka	67,006,322	5.8%
South	Kerala	43,077,063	3.7%
East	Kolkata	25,552,374	2.2%
West	Madhya Pradesh	74,897,207	6.5%
West	Maharashtra	91,460,381	8.0%
West	Mumbai	37,444,377	3.3%

East	North East	11,917,500	1.0%
East	Orissa	33,123,103	2.9%
North	Punjab	38,915,651	3.4%
West	Rajasthan	65,026,415	5.7%
South	Tamil Nadu	81,315,920	7.1%
North	U.P.(E)	98,007,657	8.5%
North	U.P. (W)	62,835,077	5.5%
East	West Bengal	55,069,254	4.8%
	Total	1,149,516,913	100%

**Source: (Press Release No.50/2020) Telecom Regulatory Authority of
India(www.trai.gov.in)**

Table no. 3.9: Actual Contribution of Mobile Subscribers and Proposed Sample Size

Area	*Actual Contribution of Mobile Subscribers in India	Proposed Sample size and its contribution to overall sample size
North	26.3%	400(25%)
East	20.2%	400(25%)
South	24.2%	400(25%)
West	29.2%	400(25%)
Total	100%	1600(100%)

***Source: (Press Release No.50/2020) Telecom Regulatory Authority of India
(www.trai.gov.in)**

For the conduct of the present study, a sample of 1600 has been considered by looking at the subscriber base of various circles and stated. Table 3.10 presents the proposed description of the sample.

Table no. 3.10: Proposed Sample Size Distribution Across Geography

Area	State/telecom circle	Town selected	Count	Total
West	Gujarat	Ahmedabad	80	400
West	Madhya Pradesh/Chhattisgarh	Bhopal	80	
West	Maharashtra	Mumbai	80	
West	Mumbai	Pune	80	
West	Rajasthan	Jaipur	80	
South	Andhra Pradesh/ Telangana	Hyderabad	100	400
South	Karnataka	Bangalore	100	
South	Kerala	Cochin	100	
South	Tamil Nadu	Chennai	100	
North	Delhi	Delhi	100	400
North	Haryana	Chandigarh	100	
North	Himachal Pradesh			
North	Punjab			
North	J & K	Srinagar	100	
North	U.P.(E)	Lucknow	100	
North	U.P. (W)			
East	Assam	Guwahati	100	400
East	North East States			
East	Bihar/Jharkhand	Patna	100	
East	Kolkata	Kolkata	100	
East	West Bengal			
East	Orissa	Bhubaneshwar	100	
Total			1600	1600

3.3.4 Sampling Method

For the conduct of the present study, a purposive sampling method is used with a quota from north, south, east and west India of 400 each has been considered. This is a non-probability sampling method. This is used for three reasons. First, the consumers are spread all over the nation and it is complicated to get in touch with them separately. Secondly, it is hard to reach

the correct no. of clients for every Indian telecom company, which is the basic requirement for the random sampling method. Thirdly time and resources for this research were limited.

The questionnaire was given to customers of the targeted city specified in Table no.3.10. To improve diversity in data collection, data were collected from three locations mobile shops, shopping malls, and cinema theatres in each city. In total 1801 samples have been collected, after removing the non-serious and/or incomplete responses, a total of 1600 samples have been taken for analysis with quota from each location mentioned in Table on. 3.10.

3.4 DATA ANALYSIS TECHNIQUES

Univariate and multivariate data analysis techniques have been used for the conduct of the study. Specifically, research tools such as Reliability Analysis, Validity Testing, Exploratory Factor Analysis, Confirmatory Factor Analysis, Chi-square test of association and Structural Equation Model (SEM) have been employed for the said purpose of the study.

Data analysis software used: Microsoft Excel, AMOS and IBM SPSS.

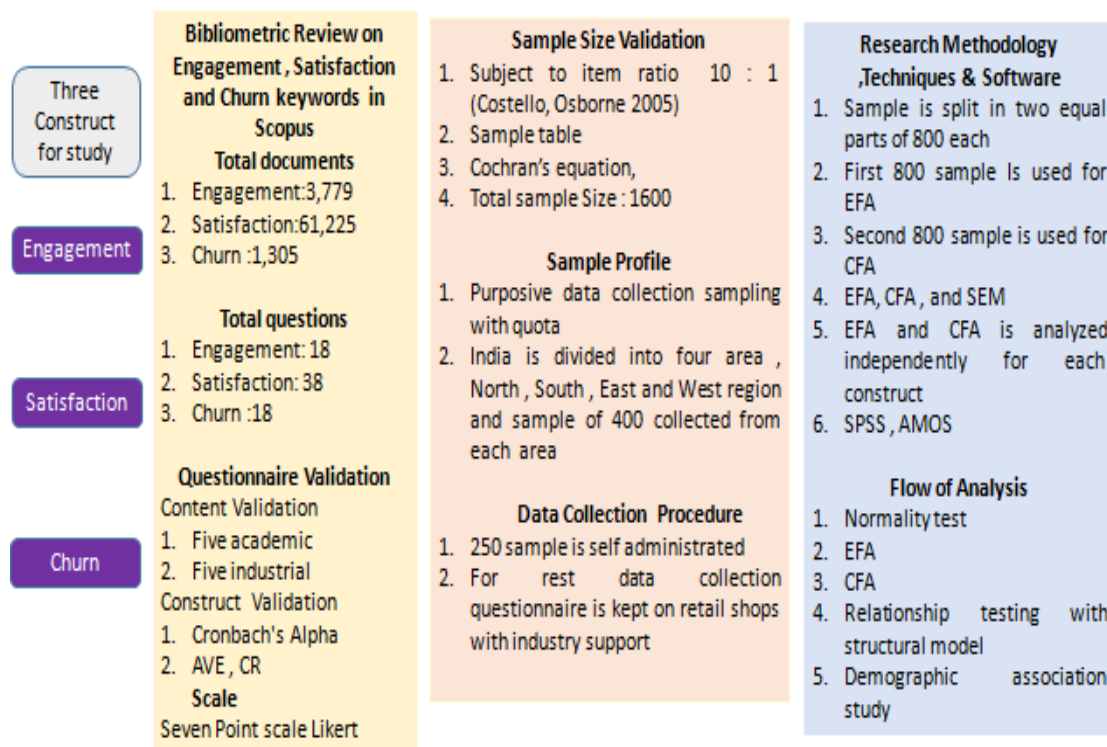


Figure no. 3.3: Summary of Research Methodology

3.5 LIMITATIONS

The limitations of the study can be enlisted below

- The study limits only to prepaid services.
- Postpaid services/enterprise products offered by the mobile service provider are not considered for this study.
- The primary data gathering was restricted to customers in India.
- The proposed study will be conducted with the purposive survey method, so its outcome will entirely depend on the respondents.
- The outcome of the study will be on the data collected from the customers, the other aspects like average revenue per user (ARPU), complaints raised by the customer with mobile service providers etc. are not part of the proposed study.

CHAPTER – IV

MEASUREMENT, VALIDITY AND ANALYSIS

This chapter presents the sample characteristics, descriptive statistics, measurement, validation and analysis part. Section 4.1 describes the sample characteristics which include operator-wise and gender analysis of the sample. Section 4.2 contains the normality test for the three constructs customer engagement, customer satisfaction and customer churn. Section 4.3 describes the measurement, validity and reliability procedure. Section 4.4 describes the process adopted for analysis. The exploratory factor analysis and confirmatory factor analysis for the three constructs of customer engagement, satisfaction and churn are presented in section 4.5.

4.1 SAMPLE CHARACTERISTICS

The sample characteristics contain the data that represents the sample. The sample characteristics of the collected sample are represented below in Table no. 4.1(a) and Table no. 4.1(b). Table no. 4.1(a) shows the distribution of the mobile subscriber base in Reliance Jio, Vodafone Idea, Airtel, and BSNL of India and the distribution of 1600 sample size among the mobile service providers.

Table no. 4.1(a): Sample Characteristics Operator Wise

Operator	Sample Contribution of The Mobile Subscribers
Reliance Jio	35%
Vodafone Idea Ltd	25%
Airtel	30%
BSNL	10%
Total	100%

In order to check the presentation of the actual mobile users, the sample size was compared with the actual user population. The population data is taken from the TRAI site, and the data of population was taken as of 30th April 2020 (Source:www.trai.gov.in; Press Release No.50/2020) from the Telecom Regulatory Authority of India. The data shows the market share as that Reliance Jio 33.83%, Vodafone Idea ltd 27.37%, Airtel 28.06% and BSNL 10.43%. Hence, we can conclude that there is not much variance between the actual data collected and the market share of the companies.

Table no. 4.1(b) shows the sample distribution among gender in an area like north, east, south and west.

Table no. 4.1(b): Sample Characteristics Male and Female

Area	Sample Contribution of The Mobile Subscribers	Sample Contribution of Male and Female		
		Gender	Count	Contribution
North	25%	Male	250	62.5%
		Female	150	37.5%
		Total	400	100.0%
East	25%	Male	234	58.5%
		Female	166	41.5%
		Total	400	100.0%
South	25%	Male	207	51.8%
		Female	193	48.3%
		Total	400	100.0%
West	25%	Male	243	60.8%
		Female	157	39.3%
		Total	400	100.0%
Total	100%	Male	934	58.4%
		Female	666	41.6%
		Total	1600	100.0%

The data released by TRAI 30th April 2020 mobile subscribers database shows the telecom customer base is spread across India and its distribution across India is north 26.30%, east 20.30%, south 24.30%, and west 29.20%. We can see from above Table no. 4.1(a) and Table no. 4.1(b) that the data on the company mix, area distribution (north, east, south and east) of the sample mix and actual population shows not much variation.

4.2 DESCRIPTIVE STATISTICS

The below section presents the normality test of the customer engagement, satisfaction and churn constructs.

4.2.1 Normality Test

To understand the normal distribution, the normality test is conducted on the sample. The normality assessment is made by assessing the measure of Skewness and Kurtosis values for

every item. Data is considered to be normal if Skewness is between -2 to +2 (Tabachnick&Fidell, 2007) and Kurtosis is between -7 to +7 (Byren, 2010).In the given analysis, the normality test is carried out independently for each construct.

4.2.1.1 Normality Test of Customer Engagement Construct

We can see from below Table no.4.2 that Skewness and Kurtosis values are laying into the desirable range (Skewness is between -2 to +2 and Kurtosis is between -7 to +7) for customer engagement construct, hence no concern is reported on the normality test and we can proceed for the further analysis.

Table no. 4.2: Assessment of Normality for Customer Engagement Construct

Item code	Minimum	Maximum	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
E1	1	7	-0.928	0.086	-0.313	0.173
E2	1	7	-0.983	0.086	-0.093	0.173
E3	1	7	-1.032	0.086	0.005	0.173
E4	1	7	-0.911	0.086	-0.556	0.173
E5	1	7	-0.920	0.086	-0.298	0.173
E6	1	7	-1.008	0.086	-0.060	0.173
E7	1	7	-0.851	0.086	-0.558	0.173
E8	1	7	-0.697	0.086	-0.606	0.173
E9	1	7	-0.895	0.086	-0.386	0.173
E10	1	7	-0.707	0.086	-0.677	0.173
E11	1	7	-0.725	0.086	-0.677	0.173
E12	1	7	-0.913	0.086	-0.463	0.173
E13	1	7	-0.645	0.086	-0.708	0.173
E14	1	7	-0.790	0.086	-0.436	0.173
E15	1	7	-0.941	0.086	-0.212	0.173
E16	1	7	-0.782	0.086	-0.461	0.173
E17	1	7	-0.842	0.086	-0.457	0.173
E18	1	7	-1.106	0.086	0.410	0.173

4.2.1.2 Normality Test of Customer Satisfaction Construct

As tabulated in Table no. 4.3, Skewness and Kurtosis values are lying in the desirable range (Skewness is between -2 to +2 and Kurtosis is between -7 to +7) for customer satisfaction construct, hence no concern about normality and we can proceed for further analysis.

Table no. 4.3: Assessment of Normality for Customer Satisfaction Construct

Item code	Minimum	Maximum	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
S1	1	7	-0.999	0.086	0.061	0.173
S2	1	7	-0.730	0.086	-0.482	0.173
S3	1	7	-0.789	0.086	-0.433	0.173
S4	1	7	-0.772	0.086	-0.551	0.173
S5	1	7	-0.809	0.086	-0.443	0.173
S6	1	7	-0.872	0.086	-0.290	0.173
S7	1	7	-0.894	0.086	-0.170	0.173
S8	1	7	-0.701	0.086	-0.743	0.173
S9	1	7	-0.808	0.086	-0.467	0.173
S10	1	7	-0.841	0.086	-0.458	0.173
S11	1	7	-0.728	0.086	-0.684	0.173
S12	1	7	-0.779	0.086	-0.599	0.173
S13	1	7	-0.802	0.086	-0.357	0.173
S14	1	7	-0.923	0.086	0.080	0.173
S15	1	7	-0.947	0.086	-0.228	0.173
S16	1	7	-0.937	0.086	-0.159	0.173
S17	1	7	-1.037	0.086	0.204	0.173
S18	1	7	-0.903	0.086	-0.318	0.173
S19	1	7	-1.030	0.086	0.066	0.173
S20	1	7	-0.981	0.086	-0.069	0.173
S21	1	7	-0.865	0.086	-0.349	0.173
S22	1	7	-1.177	0.086	0.342	0.173
S23	1	7	-0.972	0.086	-0.094	0.173
S24	1	7	-0.912	0.086	-0.218	0.173
S25	1	7	-0.839	0.086	-0.353	0.173
S26	1	7	-0.700	0.086	-0.740	0.173
S27	1	7	-0.557	0.086	-1.066	0.173
S28	1	7	-0.606	0.086	-0.956	0.173
S29	1	7	-0.849	0.086	-0.376	0.173
S30	1	7	-0.899	0.086	-0.208	0.173
S31	1	7	-0.932	0.086	-0.561	0.173
S32	1	7	-0.912	0.086	-0.309	0.173
S33	1	7	-0.771	0.086	-0.563	0.173
S34	1	7	-0.971	0.086	-0.101	0.173
S35	1	7	-0.954	0.086	-0.064	0.173
S36	1	7	-0.827	0.086	-0.496	0.173
S37	1	7	-0.904	0.086	-0.307	0.173
S38	1	7	-0.932	0.086	-0.202	0.173

4.2.1.3 Normality Test for Customer Churn Construct

Skewness (value range -2 to +2) and Kurtosis (value range 7 to +7) values are laying into the desirable range for customer churn construct. Hence referring to Table no. 4.4 we can proceed with the analysis.

Table no. 4.4: Assessment of Normality for Customer Churn Construct

Item code	Minimum	Maximum	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
CF1	1	7	0.106	0.086	-1.164	0.173
CF2	1	7	0.256	0.086	-1.177	0.173
CF3	1	7	0.115	0.086	-1.234	0.173
CA1	1	7	-0.034	0.086	0.122	0.173
CA2	1	7	-0.132	0.086	-0.065	0.173
CA3	1	7	-0.331	0.086	0.295	0.173
CE1	1	7	1.688	0.086	4.103	0.173
CE2	1	7	1.529	0.086	3.011	0.173
CE3	1	7	1.597	0.086	2.243	0.173
CV1	1	7	-1.376	0.086	0.447	0.173
CV2	1	7	-0.828	0.086	-0.740	0.173
CV3	1	7	-1.352	0.086	0.577	0.173
CN1	1	7	-0.014	0.086	-1.334	0.173
CN2	1	7	0.092	0.086	-1.310	0.173
CN3	1	7	0.104	0.086	-1.298	0.173
CB1	1	7	1.000	0.086	1.453	0.173
CB2	1	7	1.582	0.086	1.681	0.173
CB3	1	7	1.598	0.086	1.696	0.173

4.3 MEASUREMENT

According to Carmines & Zeller (1979), measurement is “a procedure by which an abstract concept is quantified, classified and interpreted”. Cronbach (1955) defined measurement as “a scientific process of assigning some numbers to some of the attributes of an abstract concept”. This was supported by researchers (e.g., Nunnally, 1978; Cherryholmes, 1988; Sireci, 1998). According to Cherryholmes(1988), “the focus of the measurement is on the crucial relationship between the empirically grounded indicators and the underlying unobservable concept”. This argument was also supported by other studies (e.g., Schmidt *et al.*, 1991; Schriesheim *et al.*,1993). The measurement procedure is used to find a true score for an event(Hinkin & Schriesheim,1989).

Validation is defined by Campbell and Fiske (1959) as “a process that evaluates the degree to which a measure succeeds in measuring what it intends to measure”.It is a

procedure of assessing the extent to which observed empirical indicators represent the underlying theoretical construct (Schriesheim *et al.*, 1991). The validation helps to minimize the variance between the observed score and its true score, normally every questionnaire or instrument comprises some degree of error. According to Bagozzi *et al.* (1991), measurement is defined as “a measure often reflects not only a theoretical concept of interest but also measurement error” which confirms the above argument on validation. Measurement error is defined by Fiske (1982) as “The extent to which an instrument captures some extraneous construct rather than capturing the true meaning of the underlying construct. The extent of measurement error, contained by an instrument, has often been assessed by looking at the degree of the random error and systematic error”. This argument is supported by Bagozzi *et al.* (1991). Random measurement error is a type of error that has no specific pattern of occurrence (Anastasi, 1976; Adcock & Collier, 2001) and generally arises due to the inherent inconsistency of human behaviour i.e., a single respondent might give differentiate from the same measure over repeated trials. Personal factors like an individual willingness to express his or her true feelings, mood swing, state of mind and degree of fatigue etc often influence the degree of random measurement error. Random measurement error generally tends to weaken the observed relationship among variables in statistical analyses and may induce errors in inference. Under some circumstances, random error may inflate parameter estimates and in some other circumstances, it may deflate the degree of observed variance (Bagozzi *et al.*, 1991). Although the presence of a random error is universally acknowledged, the degree of random errors can be minimized by employing multiple observations through multiple but highly interrelated items of the underlying theoretical construct. Systematic error (also called a non-random error) is a type of error that follows a specific pattern and generally arises due to the factors that systematically affect the measurement of a variable across the sample. The possible reason for systematic measurement error could be inadequate item representation, inappropriate item selection and poorly stated items which may result in response biases like socially desirable responding, midpoint responding and extreme responding. A systematic error has a systematic biasing effect on the measuring instrument and is generally predictable, as it always occurs in the same direction (under or overestimation) and with the same magnitude (Portney & Watkins, 2000). A systematic error does not tend to average itself through multiple observations.

As far as the assessment of random and systematic error is concerned, the extent to which a measure is free from random error is a function of reliability and the extent to which a measure is relatively free from systematic error is the function of validity (Nunnally, 1978).

4.3.1: Reliability

According to Churchill (1979), Reliability is defined as the “primary requirement of scale validity”. Reliability is nothing but the capability of a questionnaire to create the same output, each time with the assumption that the group is under the same condition (Leedy & Ormrod, 2001; Yang *et al.*, 2007; Hair *et al.*,2008). Internal consistency is a critical feature of the reliability of the instrument or questionnaire. According to Churchill (1979), internal consistency defines “the extent to which the various scale items of the same construct correlate with one another”. A high value of internal consistency shows the union of scale items towards the same meaning of construct. Cronbach’s alpha popular method for the measurement of internal consistency (Churchill, 1979; Peter, 1981). The criteria for the reliability coefficient can be shown in Table no. 4.5.

Table no. 4.5: Criteria for Reliability Coefficient

Reliability Coefficient	Credibility
Reliability ≤ 0.30	Not reliable
$0.3 < \text{Reliability} \leq 0.4$	Barely reliable, being preliminary study
$0.4 < \text{Reliability} \leq 0.5$	Slightly reliable
$0.5 < \text{Reliability} \leq 0.7$	Reliable (most common range of Reliability)
$0.70 < \text{Reliability} \leq 0.90$	Very reliable
$0.90 < \text{Reliability}$	Highly reliable

Source: Lee(2009), Villa *et al.* (2009), Veiga (2016)

Though the high degree of internal consistency of various constructs of interest supports the inert-relatedness of scale items, it does not assess the accuracy of measurement. Reliability focuses on a particular property of the measurement i.e., the extent to which the measure is free from random error. It has nothing to do with the accuracy of a measure i.e., the extent of systematic error. It is quite possible that a scale assesses something consistently but not accurately (Nunnally, 1978).

Reliability: Measurement Model

The reliability for a measurement model could find by using the below methods

- a. Composite Reliability: minimum value of composite reliability > 0.6 is required for the given construct.
- b. Average Variance Extracted: AVE > 0.5 is required for every construct. This is nothing but the average percentage of variation explained by the measuring items for a latent construct.

4.3.2 Validity

According to Campbell & Fiske (1959), “Validity is the ability of the instrument to measure what is supposed to measure for a latent construct”. There are three types of validity required for the measurement model.

Convergent Validity: In order to satisfy the convergent validity average variance extracted should be 0.5 or higher, lower factor loading may result in failure of this condition.

Construct Validity: This validity can be measured by the fitness of the index; there are many fitness of index which can be shown in Table no. 4.6 and 4.7.

Discriminant Validity: This shows the measurement model of a construct is free from redundant items. The high value of Modified Index (MI) indicates in AMOS shows items are redundant.

4.3.3 Evaluating of Fitness: Measurement Model

In SEM, there are multiple fitness indices with which model fitness can be evaluated but there is no agreement among the researcher on which fitness indexes to use. Hair *et al.* (1995, 2010) recommends the use of at minimum one fitness index from each type of model fit. Absolute Fit, Incremental Fit, and Parsimonious Fit are the three types of model fit types with the help of which can evaluate the fitness of the model. The description of the model fit type, their level of acceptance, and comments are presented below in Table no. 4.6 and 4.7.

Table no. 4.6: Model Fit Indices and Literature Support

Name of category	Name of index	Level of acceptance	Literature support
Absolute fit	Chi-Square	P-value > 0.05. Not Applicable for large sample size (>200)	Wheaton <i>et al.</i> (1977)
	RMSEA	RMSEA < 0.08	Browne & Cudeck (1993)
	GFI	GFI > 0.90	Joreskog & Sorbom (1984)
Incremental fit	AGFI	AGFI > 0.90	Tanaka & Huba (1985)
	CFI	CFI > 0.90	Bentler (1990)
	TLI	TLI > 0.90	Bentler & Bonett (1980)
	NFI	NFI > 0.90	Bollen (1989)
Parsimonious fit	Chisq/df	Chi-Square/ df < 3.0: Excellent Chi-Square/ df < 5.0: Acceptable	Marsh & Hocevar (1985)

According to Hair *et al.* (1996); Joreskog & Sorbom (1996), if the sample size obtained for the study is greater than two hundred we can overlook the absolute fit index of minimum discrepancy chi-square p-value.

The required minimum cut-off values reported by researchers may differ depending on the literature support. But, the above table represents the literature support for the most used fitness indexes.

The other cut-off criteria such as CFI>0.95, SRMR<0.08, RMSEA =<0.06, and SRMR =<0.09 has also been referred to in the literature (e.g. Hu & Bentler, 1999) for assessment of model fit. The summary of the model fit indices along with the suggested cut-offs is shown in Table no. 4.7.

Table no. 4.7: Model Fit Indices Interpretation

Measure	Terrible	Acceptable	Excellent
CMIN/DF	> 5	> 3	> 1
CFI	<0.90	<0.95	>0.95
SRMR	>0.10	>0.08	<0.08
RMSEA	>0.08	>0.06	<0.06
PClose	<0.01	<0.05	>0.05

4.4 PROCESS OF ANALYSIS

For this study, the sample has been split into two cohorts of 800 respondents each., The first sample of 800 was used for EFA to understand the factor structure of underlying constructs of customer engagement, customer satisfaction and customer churn. Another sample of 800 was used to confirm the factor structure. The Chi-square test of association has been adopted to assess the relationship of the demographic profile of the respondent with customer engagement and customer satisfaction. Structural equation modelling (SEM) using AMOS was used to test the relationship between customer engagement and customer satisfaction.

Below steps are followed for the assessment of the factor structure and content validity of underlying constructs of customer engagement, customer satisfaction and customer churn.

Step 1: EFA with the first 800 samples for all three constructs customer engagement, satisfaction and churn

Step 2: CFA with the factors identified during EFA on another set of 800 samples

- a) CFA is derived for each factor/ scale independently

- b) Then CFA is concluded with the different constructs of customer engagement, satisfaction and churn

The detailed process of analysis is described below

4.4.1 Factor Analysis

Factor analysis is a set of methods used to examine how constructs affect the responses to measured variables. Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) are the two types of factor analysis techniques.

Exploratory factor analysis (EFA) attempts to find the nature of the constructs influencing a set of responses. Confirmatory Factor analysis (CFA) is used to test whether a specific set of constructs or attributes influence responses.

4.4.1.1 Exploratory Factor Analysis

The main objective of Exploratory Factor Analysis is to define,

- The count of common factors influencing a set of measures.
- The strength of the relationship among individual factors and individual observed measures.

The use of Exploratory Factor Analysis can be explained below,

- Find the nature of the construct's original responses in a specific area.
- Conclude what sets of items are grouped in a survey.
- Validate the dimensionality of a measurement scale.
- Conclude what factors are important after the grouping of variables.
- Create factor scores signifying values of underlying constructs for use in analyses.

4.4.1.1.1 Steps in Exploratory Factor Analysis

- Data collection: customer response regarding the attributes to be collected from the questionnaire given to the customer.
- Formation of correlation matrix: correlations among each of the variables have to be originated.
- Choice of the count of factors: There are many methods to find the 'optimum' number of factors by the Kaiser criterion or Scree test.

- Extraction of the primary set of factors: Then measurements are put into the software to extract the factors with the methods, like maximum likelihood, principal component and principal axis extraction.
- Factors rotation for the result: To simplify the interpretation of the analysis factors rotation is used. There are two methods of factor rotation, orthogonal rotations which create uncorrelated factors, and oblique rotations, which create correlated factors. The best orthogonal rotation is widely believed to be Varimax.
- Interpretation of factor structure: This loading can be understood as a standardized regression coefficient, regressing the factor on measures.
- Construct factor scores: Factor scores for a factor are a linear combination of all the measures, weighted by their loading (Auerswald & Moshagen, 2019).

In the present study, data were collected on an important seven-point Likert-type scale (one being strongly disagree and seven being strongly agree) for the attributes (also referred to as items or variables or measures). To determine the number of factors for the present study “The Kaiser Criterion” and “Scree tests” were used. The “Kaiser Criterion” states that one should retain a number of factors that are equal to the number of the eigenvalues of the correlation matrix that are greater than one. The other method the “Scree Test” states that draw the eigenvalues of the correlation matrix in descending order, and then use a number of factors equal to the number of eigenvalues that occur prior to the last major drop in eigenvalue magnitude.

The initial factors went through an orthogonal rotation (varimax rotation) for interpretation simplification. Factors are formed with the attributes which were defined in the questionnaire. Items with factor loading with more than a value of 0.5 are considered for the analysis. The attribute having the highest correlation with the factor is grouped under the factor.

4.4.1.2 Confirmatory Factor Analysis(CFA)

The statistical procedure conducted to confirm the factor or construct of the observed variables or attributes is known as Confirmatory factor analysis (CFA). This is one form of factor analysis and is commonly used in social science to confirm the factors. The confirmatory factor analysis can be used for the testing hypothesis that a relationship between observed variables and their underlying latent constructs. The Confirmatory Factor

Analysis(CFA) was developed by Joreskog (1969) and then replaced with older methods of analysing construct validity as defined by Campbell and Fiske (1959).

In order to analyse the given study, the factors derived from factor analysis for customer engagement, customer satisfaction and customer churn are used for CFA with another set of 800 data.

4.4.2 Structural Equation Modelling

Structural Equation Modelling is a method used for testing and estimating causal relations using a mixture of statistical databases and qualitative assumptions in statistics. This can be used for exploratory and confirmatory modelling. In the exploratory method, its exploration of the model with the study in another method confirmatory modelling typically begins with a hypothesis that gets presented in a causal model and the model is tested with the measurement database to find how the model fits. When the Structured Equation Model (SEM) is used purely for exploration, this is generally in the reference to exploratory factor analysis (EFA) as in the psychometric proposal.

According to Bagozzi (1981), the Structured Equation Model (SEM) denotes different cases like Factor analysis, path analysis and regression. The Structured Equation Model (SEM) provides the ability to construct latent not measured variables directly, here variables are projected in the model from numerous measured variables each of which is called a latent variable. This allows the modeller to note down the unreliability of measurement in the model, which in theory allows the structural relations between latent variables to be estimated (Bagozzi& Yi, 1988; Byrne,2020).

4.5 EXPLORATORY FACTOR ANALYSIS (EFA) AND CONFIRMATORY FACTOR (CFA): CUSTOMER ENGAGEMENT, SATISFACTION AND CHURN

The exploratory factor analysis and confirmatory factor analysis of the three constructs of customer engagement, customer satisfaction and customer churn are presented below

4.5.1 Exploratory Factor Analysis (EFA) And Confirmatory Factor Analysis (CFA) For Customer Engagement Constructs

The exploratory factor analysis(EFA) and confirmatory factor analysis(CFA) of the customer engagement constructs are presented below

4.5.1.1 Exploratory Factor Analysis of Customer Engagement Constructs

The SPSS output for factor analysis of customer engagement is shown below

Table. No. 4.8: Initial Eigenvalues Customer Engagement Constructs

Component	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	8.456	46.976	46.976
2	1.405	7.804	54.780
3	.986	5.480	60.260
4	.903	5.017	65.277
5	.807	4.485	69.762
6	.641	3.563	73.324
7	.591	3.286	76.610
8	.560	3.112	79.723
9	.539	2.997	82.720
10	.477	2.652	85.371
11	.440	2.442	87.813
12	.392	2.179	89.993
13	.375	2.085	92.078
14	.335	1.859	93.937
15	.321	1.785	95.722
16	.283	1.574	97.296
17	.255	1.418	98.714
18	.232	1.286	100.000

Extraction Method: Principal Component Analysis.

Table no. 4.9: Total Variance Explained Customer Engagement Constructs

Component	Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.456	46.976	46.976	5.074	28.190	28.190
2	1.405	7.804	54.780	4.786	26.591	54.780

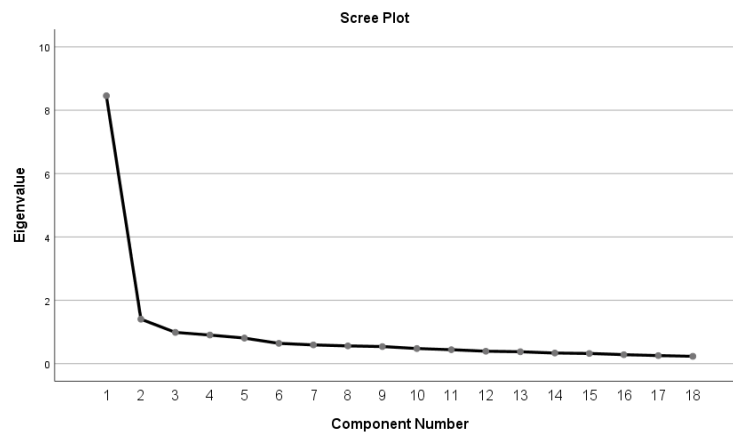


Figure no. 4.1: Scree Plot of Customer Engagement Constructs

The above analysis (Table no. 4.8) shows that two factors have greater than one eigenvalue and the scree plot indicates the first major drop in eigenvalues after the second factor. So it was concluded that the above analysis can be carried out with two factors. The correlation matrix (principal component analysis), indicates that 54.780 per cent of the total variation is explained by two factors only.

Table no. 4.10: Rotated Component Matrix of Customer Engagement Constructs

	Component	
	1	2
E2	.800	.218
E1	.788	.317
E5	.784	.262
E3	.777	.164
E4	.707	.370
E6	.639	.296
E7	.625	.409
E12*	.476	.466
E17*	.456	.379
E8	.242	.732
E10	.282	.716
E16	.202	.709
E11	.285	.703
E14	.341	.678
E18	.224	.664
E15	.203	.585
E13	.423	.519
E9*	.461	.481

Extraction Method: Principal Component Analysis.
 Rotation Method: Varimax with Kaiser Normalization.
 a. Rotation converged in 3 iterations.

*Attributes/variable less than 0.5-factor loading, hence removed from the factor analysis

4.5.1.1.1 Explanation of the Factors Derived for Customer Engagement

The factor analysis extracted two factors from eighteen attributes. These factors or constructs has been grouped into two constructs and with the help of percentage, and variation explained we can judge the importance of the constructs or factors.

As per the outcome of the factor analysis, Factor 1 comes out as the most critical factor that explains 28.19 per cent of the total variation. Factor 2 describes 26.591 per cent of the total variation. Moreover, all statistically significant factors together explain 54.78 per

cent of the variation. This indicated that 54.78 per cent of customer engagement can be explained by these two factors.

Factor 1: Human-based Customer Engagement: This factor of customer engagement contributes to 28.19 per cent variance explanations. High factor loadings (> 0.5) justify the significance of scale items.

This factor consists of call centres, multibrand outlets, retailers, written letters, franchisee stores and company store items. As all these items are inclined toward human intervention in the engagement process so this factor is named Human-based Customer Engagement.

Factor 2: Machine-based Customer Engagement: This factor of customer engagement contributes to 26.591per cent variance explanations. High factor loadings (> 0.5) justify the significance of scale items. This factor consists of mobile apps, SMS, webchat, interactive voice response, third-party app, emails, and websites. As all these items are inclined toward - machine-based customer engagement so this factor is named as Machine-based Customer Engagement.

4.5.1.1.2 Statistical Significance of the Factor Analysis

The value of Cronbach’s Alpha indicates the internal consistency of scale items. . The following Table no 4.11 indicates the SPSS output indicating the values of Cronbach’s Alpha for the above two factors

Reliability Test Using Cronbach’s Alpha

Table no.4.11: Reliability Test Customer Engagement

Factor Name	Cronbach's Alpha	N of Items
Machine-based customer engagement	0.902	7
Human-based customer engagement	0.871	8

In the above-mentioned reliability statistics (Table no. 4.11), it is clear that Cronbach's Alpha indicates a high level of reliability (more than 0.6) for the two constructs. The extracted two factors explain 54.78 per cent of the variance cumulatively.

4.5.1.2 Confirmatory Factor Analysis of Customer Engagement Constructs

The factors derived from the exploratory factor analysis are used for the confirmatory factor analysis with another set of 800 respondents. The confirmatory factor analysis for customer engagement constructs is described below.

4.5.1.2.1 Measurement and Validation of Customer Engagement Construct

The measurement and validation of each factor of the customer engagement construct are presented below

4.5.1.2.1.1 Measurement and Validation of Human-Based Customer Engagement Scale

CFA model (Figure no. 4.2) is developed from the factors derived from exploratory factor analyses. The result of the CFA model reveals a Chi-square index of 87.118 with 14 degree of freedom i.e. a Normed Chi-square index of 6.223, GFI = 0.970; AGFI = 0.941; NFI = 0.971; CFI = 0.976; RMR = 0.098 and RMSEA = 0.081. Standardized residuals (Table no. 4.12).

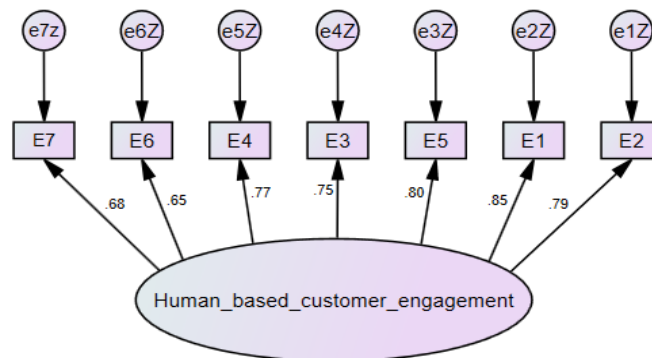


Figure no. 4.2: CFA Model for Human-Based Customer Engagement Scale

Table no. 4.12: Standardized Factor Loadings and Residuals for Human-Based Customer Engagement Scale

Item code	Standardize factor loading	Standardized Residuals Covariances							
		E7	E6	E4	E3	E5	E1	E2	
E7	0.68	0							
E6	0.65	2.125	0						
E4	0.77	-0.873	0.085	0					
E3	0.75	-1.639	0.461	0.438	0				
E5	0.8	-0.525	-0.692	0.771	-0.066	0			
E1	0.85	0.369	-1.36	-0.117	0.565	0.19	0		
E2	0.79	0.949	1.008	-0.502	-0.417	-0.232	-0.052	0	

The above result shows concern on the model fit indices like Normed Chi-square index of 6.223 is above the acceptance level; hence to improve the model fit modified indices (MI) were used. The MI with a higher value was chosen from below Table no. 4.13 to make redundant free, the revised model is formed which was tested for model fit indices. (Mohamad, 2012).

Table no. 4.13: Modified indices for Human-Based Customer Engagement Scale

	M.I.	Par Change
e6Z <--> e7z	20.538	.322
e5Z <--> e7z	5.400	-.171
e4Z <--> e7z	17.269	-.272
e3Z <--> e5Z	7.072	.161
e2Z <--> e6Z	20.470	-.241
e2Z <--> e4Z	5.042	.109
e1Z <--> e7z	7.254	.169
e1Z <--> e6Z	7.383	.156

The result of the modified CFA model (Figure no. 4.3) reveals a Chi-square index of 41.590 with 12 degree of freedom i.e. a Normed Chi-square index of 3.466, GFI = 0.985; AGFI = 0.964; NFI = 0.986; CFI = 0.990; RMR = 0.073 and RMSEA = 0.05. Standardized residuals (Table no. 4.14).

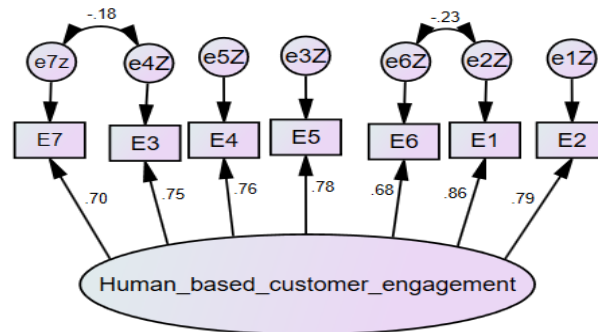


Figure no. 4.3: Revised CFA Model for Human-Based Customer Engagement Scale

Table no. 4.14: Revised Standardized Residual Covariances for Human-Based Customer Engagement

Item code	Standardize factor loading	Revised Standardized Residual Covariances						
		E7	E6	E4	E3	E5	E1	E2
E7	0.70	.000						
E6	0.68	1.298	.000					
E4	0.76	-1.032	-.311	.000				
E3	0.75	.000	-.240	.446	.000			
E5	0.78	-.654	-1.062	1.177	-.020	.000		
E1	0.86	-.169	.000	-.122	.189	.226	.000	

Item code	Standardize factor loading	Revised Standardized Residual Covariances						
E2	0.79	.681	.497	-.251	-.514	.067	-.173	.000

The validity analysis shows CR=0.906 and AVE =0.581, hence no validity concern.

4.5.1.2.1.2 Measurement and Validation of Machine-Based Customer Engagement Scale

For the machine-based customer engagement factor, the CFA model (Figure no. 4.4) is developed basis on the exploratory factor analysis of the customer engagement construct. The CFA model fit indices are Chi-square index of 98.271 with 20 degree of freedom i.e. a Normed Chi-square index of 4.914, GFI = 0.971; AGFI = 0.946; NFI = 0.968; CFI = 0.974; RMR = 0.097; RMSEA = 0.070; CR=0.897 and AVE=0. 522.Standardized residuals (Table no. 4.15).

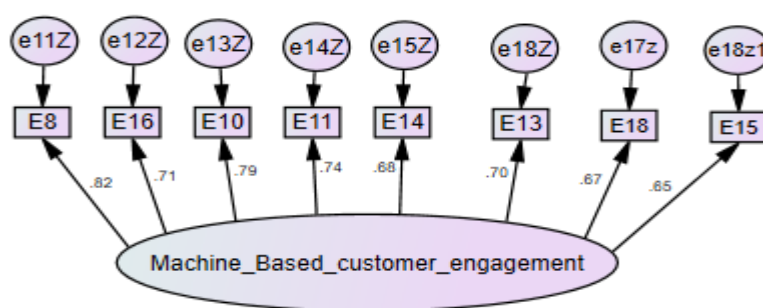


Figure no. 4.4: CFA Model for Machine-Based Customer Engagement Scale

Table no. 4.15: Standardized Factor Loadings and Residuals for Machine-Based Customer Engagement

Item code	Standardize factor loading	Standardized Residuals Covariances							
		E15	E18	E13	E14	E11	E10	E16	E8
E15	0.65	.000							
E18	0.67	-.365	.000						
E13	0.70	.217	-.954	.000					
E14	0.68	-1.776	.453	.559	.000				
E11	0.74	1.578	-.259	.622	.615	.000			
E10	0.79	-.806	.012	-.276	.022	.182	.000		
E16	0.71	-1.175	.994	.077	1.680	-1.457	-.034	.000	
E8	0.82	1.237	.039	-.131	-1.083	-.508	.371	.121	.000

Validity Analysis shows that CR = 0.801 and AVE = 0.502 is within the acceptable range hence no validity concern here.

4.5.1.3 Dimensionality of Customer Engagement

After the measurement and validation of various sub-dimensions of customer engagement, the dimensionality of the customer engagement construct has been assessed. There is a double opinion regarding the dimensionality of the customer engagement construct. One set of studies considers customer engagement as a uni-dimensional construct, whereas another set of studies has affirmed the multi-dimensionality of the construct of customer engagement. The supporters of the uni-dimensional view of customer engagement (Flynn, 2012; Vivek *et al.*, 2014; Kuvykaitė & Tarutė, 2015; McKinsey, 2017) have considered the high degree of positive correlation between the different dimensions of customer engagement as a basis for uni-dimensionality. According to them, the focal dimensions of customer engagement are highly inter-correlated. Therefore, it is better to combine them into a single construct. On the other side, proponents of a multi-dimensional view of customer engagement (e.g., Brodie *et al.*, 2011; Vivek *et al.*, 2014), claim that human and machine-based intervention may lead to different results so these dimensions of customer engagement should be studied separately. Both of the arguments have a sound theoretical basis. So, in the context of the present study, two separate CFA models i.e., customer engagement as a uni-dimensional construct and customer engagement as a multi-dimensional construct have been considered for the study.

4.5.1.3.1 Measurement and Validation of Customer Engagement (Multi-Dimensional)

To simplify the CFA below coding was done for factor name, factor: F1: Human-based customer engagement, F2: Machine-based customer engagement. The CFA model (Figure no. 4.5) reveals a Chi-square index of 615.183 with 89 degree of freedom i.e. a Normed Chi-square index of 6.912, GFI = 0.883; AGFI = 0.914; NFI = 0.911; CFI = 0.923; RMR = 0.170 and RMSEA = 0.086. Standardized residuals (Table no. 4.16).

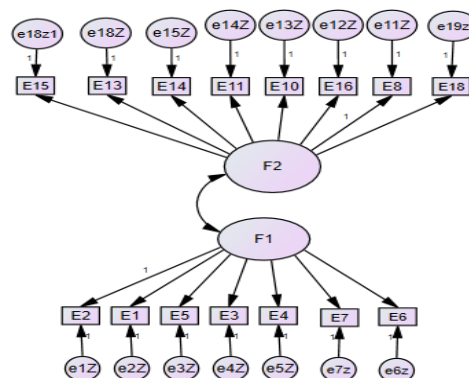
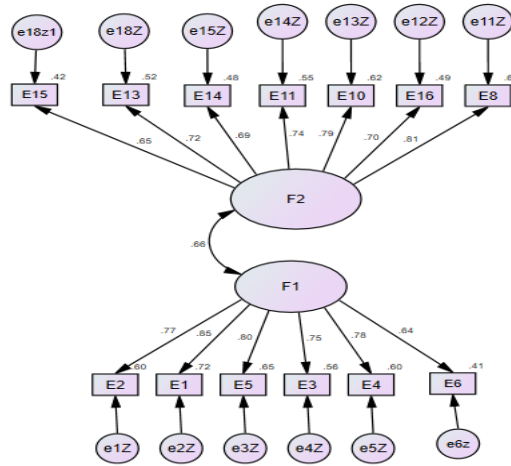


Figure no. 4.5: CFA Model for Customer Engagement (Multi-dimensional) Construct

**Table no. 4.16: Standardized Residuals for Customer Engagement (Multi-dimensional)
Construct**

Standardized Residuals Covariances															
	E6	E18	E7	E4	E3	E5	E1	E2	E15	E13	E14	E11	E10	E16	E8
E6	0.0														
E18	3.5	0.0													
E7	1.9	0.8	0.0												
E4	0.0	0.3	-1.2	0.0											
E3	0.6	0.9	-1.8	0.5	0.0										
E5	-0.7	-3.2	-0.8	0.7	0.1	0.0									
E1	-1.4	0.4	0.0	-0.2	0.7	0.2	0.0								
E2	1.1	-1.0	0.8	-0.4	-0.1	-0.1	0.1	0.0							
E15	0.4	-0.3	-0.2	-0.8	-1.4	0.0	-0.6	-2.5	0.0						
E13	1.3	-1.1	4.1	1.7	-0.1	1.8	1.0	1.6	0.1	0.0					
E14	1.0	0.3	4.7	3.0	-0.1	1.0	1.7	-0.5	-1.9	0.1	0.0				
E11	0.8	-0.4	3.8	1.5	-1.4	0.2	0.2	0.4	1.6	0.3	0.3	0.0			
E10	-1.6	0.1	2.1	1.4	-1.3	-0.6	0.1	-1.5	-0.7	-0.5	-0.2	0.1	0.0		
E16	-0.9	1.1	-0.3	-1.3	-2.0	-0.3	0.5	-2.0	-1.0	0.0	1.5	-1.5	0.1	0.0	
E8	-1.7	0.3	2.0	-1.8	-2.4	-0.3	-1.2	-2.2	1.6	-0.2	-1.1	-0.4	0.6	0.4	0.0

The above model fit indices are not adequate for model fit e.g., Normed Chi-square index of 6.912 is above the acceptable level, hence to do the model fit, basis on the standardized residuals analysis study, the items with a higher standardised residual value from Table no. 4.16 has been deleted. The process is repeated till the achievement of the desired level of model fit and the value of standardized residual to reach less than 3. As a result items, E7 (standard residual value above 3) and E18 (standard residual value above 3) were deleted. The revised model reveals a Chi-square index of 301.910 with 64 degree of freedom i.e. a Normed Chi-square index of 4.717, GFI = 0.947; AGFI = 0.924; NFI = 0.947; CFI = 0.958; RMR = 0.136 and RMSEA = 0.068. Standardized residuals for the revised model (Table no. 4.17). The deletion process of the standardised item is followed as per the SEM handbook (Mohamad, 2012).



**Figure no. 4.6: Revised CFA Model for Customer Engagement (Multi-dimensional)
Construct**

**Table no. 4.17: Standardized Residuals of Customer Engagement (Multi-dimensional)
for Revised Model**

Standardized ResidualsCovariances													
	E6	E4	E3	E5	E1	E2	E15	E13	E14	E11	E10	E16	E8
E6	0.0												
E4	0.2	0.0											
E3	0.7	0.2	0.0										
E5	-0.5	0.4	-0.3	0.0									
E1	-1.1	-0.4	0.5	0.0	0.0								
E2	1.5	-0.5	-0.2	-0.1	0.2	0.0							
E15	0.7	-0.7	-1.3	0.1	-0.4	-2.3	0.0						
E13	1.6	1.7	-0.1	1.9	1.2	1.9	0.0	0.0					
E14	1.5	3.2	0.1	1.2	2.1	-0.1	-1.9	0.1	0.0				
E11	1.2	1.6	-1.3	0.4	0.4	0.8	1.5	0.1	0.3	0.0			
E10	-1.1	1.5	-1.2	-0.5	0.4	-1.1	-0.7	-0.6	-0.1	0.1	0.0		
E16	-0.4	-1.1	-1.9	0.0	0.9	-1.6	-1.0	-0.1	1.7	-1.4	0.2	0.0	
E8	-1.3	-1.6	-2.3	-0.1	-0.9	-1.8	1.5	-0.3	-1.0	-0.4	0.7	0.6	0.0

The above model fit result shows all model fit indices are in the acceptable range for the construct.

Table no. 4.18: Discriminant Validity Analysis for Customer Engagement (Multi-dimensional) Model

	CR	AVE	MSV	MaxR(H)	Machine-based customer engagement (F2)	Human-based customer engagement (F1)
Machine-based customer engagement (F2)	0.888	0.533	0.433	0.894	0.730	
Human-based customer engagement (F1)	0.896	0.590	0.433	0.904	0.658***	0.768

*** p < 0.001

Validity Analysis shows that CR is above 0.7, AVE is above 0.50 is within the acceptable range. The diagonal value (in bold) in Table no. 4.18 is the square root of the Average Variance Extracted for the factor whereas the rest values are the correlation between the respective factors or constructs. The discriminant validity is achieved when a diagonal value (in bold) is more than the values in its row and column. Referring to Table no. 4.18, we can say that the discriminant validity for all factors or constructs is achieved.

Table no. 4.19: CFA Report for Customer Engagement (Multi-dimensional) Construct

Construct	Item code	Factor Loading	CR	AVE
Human-based customer engagement (Factor Label: F1)	E1	0.85	0.896	0.59
	E2	0.77		
	E3	0.75		
	E4	0.78		
	E5	0.8		
	E6	0.64		
	E7	Delete		
Machine-based customer engagement (Factor Label: F2)	E8	0.81	0.888	0.533
	E10	0.79		
	E11	0.74		
	E13	0.72		
	E14	0.69		
	E15	0.65		
	E16	0.7		
E18	Delete			

Table no. 4.20: Summary of Engagement (Multi-dimensional) Construct Model Fit Indices

Sr no	Parameter	Model fit indices
1	Normalised Chi-square (ratio of Chi-square to degrees of freedom)	4.717
2	Goodness-of-Fit Index (GFI)	0.947
3	Adjusted Goodness-of-Fit Index (AGFI)	0.924
4	Normalised Fit Index (NFI)	0.947
5	Comparative Fit Index (CFI)	0.958
6	Root Mean Square Residual (RMR)	0.136
7	Root Mean Square Error of Approximation (RMSEA)	0.068
8	Standardized Residuals	Less than 3.5
9	Standardized factor loadings (SFL)	Above 0.5
10	Average Variance Extracted (AVE)	Above 0.5
11	Composite Reliability (CR)	Above 0.6

4.5.1.3.2 Measurement and Validation of Customer Engagement (Uni-dimensional)

The uni-dimensional view of the CFA model for customer engagement construct has been presented in Figure 4.7. To simplify the CFA below coding was done for factor name, factor: F1: Human-based customer engagement, F2: Machine-based customer engagement. The CFA model (Figure no. 4.7) reveals a Chi-square index of 309.910 with 64 degree of freedom i.e. a Normed Chi-square index of 4.717 GFI = 0.947; AGFI = 0.924; NFI = 0.947; CFI = 0.958; RMR = 0.136 and RMSEA = 0.068. Standardized residuals (Table no. 4.21).

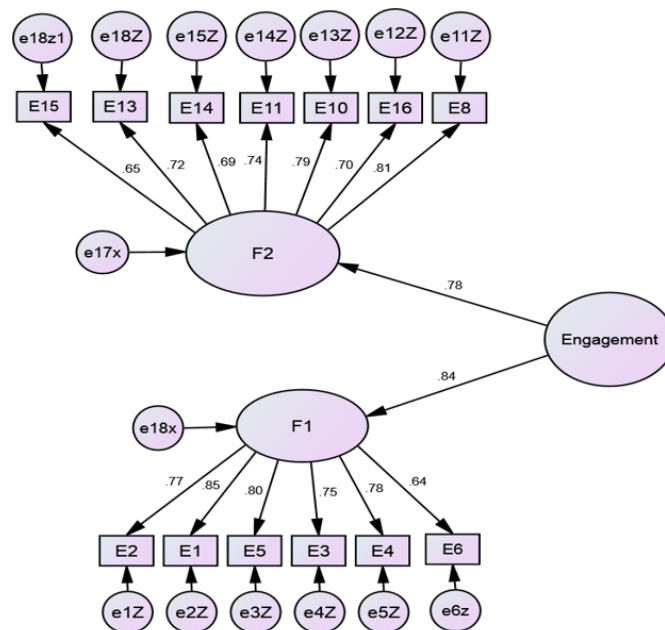


Figure no. 4.7: CFA Model for Customer Engagement (Uni-Dimensional) Construct

**Table no. 4.21: Standardized Residuals for Customer Engagement(Uni-Dimensional)
Construct**

	Standardized Residuals Covarinces												
	E6	E4	E3	E5	E1	E2	E15	E13	E14	E11	E10	E16	E8
E6	0.0												
E4	0.2	0.0											
E3	0.7	0.2	0.0										
E5	-0.5	0.4	-0.3	0.0									
E1	-1.1	-0.4	0.5	0.0	0.0								
E2	1.5	-0.5	-0.2	-0.1	0.2	0.0							
E15	0.7	-0.7	-1.3	0.1	-0.4	-2.3	0.0						
E13	1.6	1.7	-0.1	1.9	1.2	1.9	0.0	0.0					
E14	1.5	3.2	0.1	1.2	2.1	-0.1	-1.9	0.1	0.0				
E11	1.2	1.6	-1.3	0.4	0.4	0.8	1.5	0.1	0.3	0.0			
E10	-1.1	1.5	-1.2	-0.5	0.4	-1.1	-0.7	-0.6	-0.1	0.1	0.0		
E16	-0.4	-1.1	-1.9	0.0	0.9	-1.6	-1.0	-0.1	1.7	-1.4	0.2	0.0	
E8	-1.3	-1.6	-2.3	-0.1	-0.9	-1.8	1.5	-0.3	-1.0	-0.4	0.7	0.6	0.0

Validity Analysis shows that CR is 0.795, and AVE is 0.660 are within the acceptable range. Since only one latent variance so there is no correlation matrix.

Table no. 4.22: CFA Report for Customer Engagement (Uni-Dimensional) Construct

Construct	Sub Construct/ dimension	Factor loading for construct	Item code	Factor Loading for Sub Construct	CR for construct	CR Sub Construct	AVE for construct	AVE Sub Construct
Customer engagement	Human-based customer engagement (Factor Label: F1)	0.84	E1	0.85	0.793	0.895	0.657	0.590
			E2	0.77				
			E3	0.75				
			E4	0.78				
			E5	0.80				
			E6	0.64				
			E7	Delete				
	Machine- based customer engagement (Factor Label: F2)	0.78	E8	0.81		0.888		0.534
			E10	0.79				
			E11	0.74				
			E13	0.72				
			E14	0.69				
			E15	0.65				
			E16	0.70				
E18	Delete							

Table no. 4.23: Summary of Engagement (Uni-Dimensional) Construct Model Fit Indices

Sr no	Parameter	Model fit indices
1	Normalised Chi-square (ratio of Chi-square to degrees of freedom)	4.717
2	Goodness-of-Fit Index (GFI)	0.947
3	Adjusted Goodness-of-Fit Index (AGFI)	0.924
4	Normalised Fit Index (NFI)	0.947
5	Comparative Fit Index (CFI)	0.958
6	Root Mean Square Residual (RMR)	0.136
7	Root Mean Square Error of Approximation (RMSEA)	0.068
8	Standardized Residuals	Less than 3.5
9	Standardized Factor Loadings (SFL)	Above 0.5
10	Average Variance Extracted (AVE)	Above 0.5
11	Composite Reliability (CR)	Above 0.6

4.5.2 Exploratory Factor Analysis (EFA) And Confirmatory Factor (CFA) Analysis for Customer Satisfaction Constructs

The exploratory factor analysis and confirmatory factor analysis of the customer satisfaction construct customer engagement is presented below

4.5.2.1 Exploratory Factor Analysis of Customer Satisfaction Constructs

The SPSS output for factor analysis of customer satisfaction is shown below

Table no. 4.24: Initial Eigenvalues Customer Satisfaction Constructs

Component	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	17.766	46.753	46.753
2	1.901	5.001	51.754
3	1.436	3.780	55.534
4	1.223	3.219	58.753
5	1.200	3.159	61.912
6	.889	2.339	64.251
7	.872	2.294	66.544
8	.737	1.941	68.485
9	.705	1.856	70.341
10	.650	1.711	72.053
11	.639	1.681	73.734
12	.608	1.600	75.334
13	.581	1.529	76.863

14	.560	1.473	78.336
15	.535	1.407	79.743
16	.516	1.357	81.100
17	.473	1.246	82.346
18	.457	1.202	83.548
19	.449	1.181	84.729
20	.445	1.171	85.900
21	.411	1.082	86.983
22	.396	1.042	88.024
23	.387	1.019	89.043
24	.372	.980	90.024
25	.355	.935	90.959
26	.342	.899	91.858
27	.336	.884	92.742
28	.320	.842	93.584
29	.312	.821	94.405
30	.300	.789	95.194
31	.267	.703	95.897
32	.259	.682	96.579
33	.240	.632	97.211
34	.238	.626	97.837
35	.232	.611	98.448
36	.215	.565	99.013
37	.203	.535	99.548
38	.172	.452	100.000

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Table no. 4.25: Total Variance Explained Customer Satisfaction Constructs

Component	Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	17.766	46.753	46.753	6.231	16.397	16.397
2	1.901	5.001	51.754	6.126	16.120	32.517
3	1.436	3.780	55.534	3.987	10.493	43.010
4	1.223	3.219	58.753	3.945	10.381	53.391
5	1.200	3.159	61.912	3.238	8.520	61.912

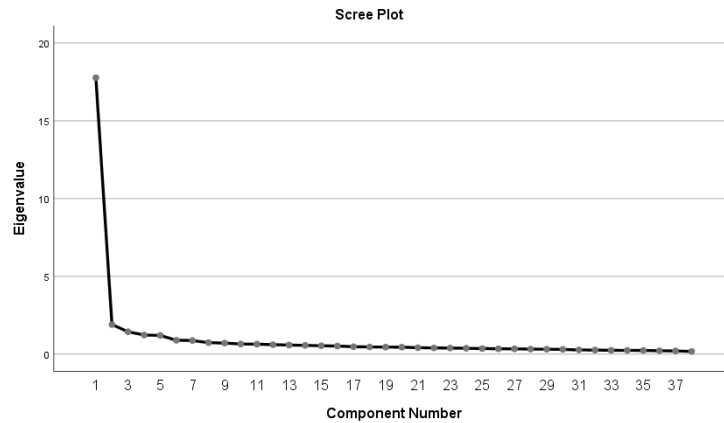


Figure no. 4.8: Scree Plot of Customer Satisfaction Constructs

The above analysis (Table no. 4.24) shows that five factors have greater than one eigenvalue. So it was concluded that considering the Kaiser criterion, the analysis can be carried out with five factors. The correlation matrix (principal component analysis), indicates that 61.912 per cent of the total variation is explained by five factors only.

Table no. 4.26: Rotated Component Matrix of Customer Satisfaction Constructs

	Component				
	1	2	3	4	5
S17	0.7	0.235	0.179	0.167	0.177
S19	0.693	0.223	0.335	0.241	0.061
S18	0.688	0.195	0.257	0.238	0.119
S20	0.687	0.244	0.136	0.203	0.283
S21	0.672	0.343	0.257	0.193	0.161
S22	0.613	0.298	0.099	0.128	0.274
S23	0.598	0.311	0.221	0.161	0.244
S26	0.58	0.374	0.233	0.268	-0.014
S24	0.558	0.252	0.168	0.374	0.25
S25	0.531	0.261	0.134	0.312	0.376
S31*	0.449	0.414	0.298	0.279	0.204
S1	0.248	0.725	0.138	0.172	0.164
S2	0.304	0.697	0.246	0.105	0.014
S3	0.23	0.658	0.112	0.258	0.22
S4	0.205	0.657	0.189	0.212	0.36
S5	0.245	0.642	0.064	0.141	0.299
S6	0.479	0.577	0.173	0.185	0.074
S7	0.263	0.554	0.383	0.087	0.223

S8	0.359	0.544	0.262	0.203	0.09
S9	0.264	0.535	0.255	0.175	0.374
S38*	0.277	0.494	0.35	0.077	0.204
S35*	0.223	0.484	0.418	0.149	0.268
S34*	0.295	0.457	0.205	0.369	0.253
S36*	0.112	0.449	0.408	0.298	0.396
S12	0.134	0.318	0.698	0.154	0.221
S11	0.211	0.124	0.694	0.177	0.197
S10	0.256	0.175	0.693	0.197	0.099
S13	0.365	0.22	0.615	0.212	0.114
S32*	0.323	0.306	0.418	0.336	0.083
S33*	0.264	0.336	0.4	0.347	0.232
S30	0.231	0.107	0.198	0.768	0.005
S27	0.199	0.157	0.157	0.746	0.163
S28	0.2	0.163	0.186	0.719	0.26
S29	0.234	0.25	0.117	0.699	-0.041
S37*	0.404	0.202	0.307	0.448	0.194
S14	0.165	0.213	0.272	0.091	0.751
S15	0.234	0.241	0.133	0.124	0.73
S16	0.314	0.324	0.189	0.08	0.684

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 7 iterations.

* Variables/attributes deleted from the analysis as factor loading is less than 0.5.

4.5.2.1.1 Explanation of the Factors Derived for Customer Satisfaction

The factor analysis extracted five factors of the construct. The list below summarizes all the attributes that have been grouped into different factors.

As per the result of the factor analysis, Factor 1 comes out as the most critical factor that explains 16.397 per cent of the total variation. This is followed by Factor 2 which describes 16.120 per cent of the total variation and subsequently by Factor 3 which explains 10.493 per cent of the total variation, Factor 4 which describes 10.381 per cent of the total variation and Factor 5 describes 8.520 per cent of the total variance. Moreover, all statistically significant factors together explain 61.912 per cent of the variation. This indicated that 61.912 per cent of customer satisfaction can be explained by these five factors.

Factor 1:Network: This factor of customer satisfaction contributes to 16.397 per cent variance explanations. This factor consists of voice coverage, call drop, video buffering/streaming

experience, online gaming experience, mobile network data coverage, voice quality, network busy or call congestion and SMS service. As all these items are inclined towards network related in the telecom industry so this factor is named a network. High factor loadings (> 0.5) justify the significance of scale items. Factor 2: Value: This factor of customer satisfaction contributes to 16.120 per cent variance explanations. This factor consists of over-the-top (OTT), economical tariff plans, a variety of tariff plans, value for money tariff plans, value-added services (VAS), goodwill gestures, promise fulfilment and communications. As all these items are inclined towards value given to the customer by the mobile service provider so this factor is named value. High factor loadings (> 0.5) justify the significance of scale items. Factor 3: Care: This factor of customer satisfaction contributes to 10.493 per cent variance explanations. This factor consists of new product information, new technology products, documentation process and service consistency. As all these items are inclined towards care taken by mobile service providers so this factor is named care. High factor loadings (> 0.5) justify the significance of scale items. Factor 4: Experience: This factor of customer satisfaction contributes to 10.381 per cent variance explanations. This factor consists of solving customer issues, response, first time right, and billing accuracy. As all these items are inclined towards customer experience so this factor is named experience. High factor loadings (> 0.5) justify the significance of scale items. Factor 5: Delight: This factor of customer satisfaction contributes to 8.520 per cent variance explanations. This factor consists of feels good, meets my needs and happiness. As all these items are inclined towards delight so this factor is named delight. High factor loadings (> 0.5) justify the significance of scale items.

4.5.2.1.2 Statistical Significance of the Factor Analysis

The value of Cronbach's Alpha indicates the internal consistency of scale items. The following Table no. 4.27 indicate the SPSS output indicating the values of Cronbach's Alpha for the four extracted factors.

Reliability Test Using Cronbach's Alpha

Table no. 4.27: Reliability Test for Customer Satisfaction Construct

Factor Name	Cronbach's Alpha	N of Items
Network	0.929	10
Value	0.914	9
Care	0.820	4
Experience	0.838	4
Delight	0.840	3

In the above-mentioned reliability statistics, it is clear that Cronbach's Alpha indicates a high level of reliability (more than 0.6) for all five constructs.

4.5.2.2 Confirmatory Factor Analysis of Customer Satisfaction Constructs

The factors derived from the exploratory factor analysis are used for the confirmatory factor analysis with another set of 800 respondents. The confirmatory factor analysis for customer satisfaction constructs is described below

4.5.2.2.1 Measurement and Validation of Customer Satisfaction Construct

The five constructs/factors namely network, value, care, experience and delight which were derived from EFA have been taken for CFA with another set of 800 respondents.

4.5.2.2.2 Measurement and Validation of Network Scale

The result of CFA (Figure no.4.9) shows a Chi-square index of 125.740 with 35 degree of freedom i.e. a Normed Chi-square index of 3.593, GFI = 0.968; AGFI = 0.949; NFI = 0.969; CFI = 0.977; RMR = 0.084 and RMSEA = 0.057. Standardized residuals (Table no. 4.28).

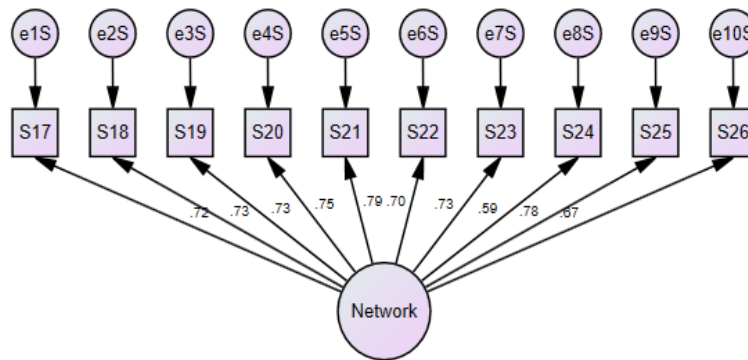


Figure no. 4.9: CFA Model for Network Scale

Table no. 4.28: Standardized Factor Loadings and Residuals for Network Scale

Item code	Standardized Factor Loadings	Standardized Residual Covariances												
		S26	S25	S24	S23	S22	S21	S20	S19	S18	S17			
S26	0.67	.000												
S25	0.78	-.757	.000											
S24	0.59	-.026	-.225	.000										
S23	0.73	.264	.224	-.562	.000									
S22	0.70	1.566	-.245	.151	-.683	.000								
S21	0.79	-.915	.620	.272	.515	-.759	.000							
S20	0.75	.988	-.657	-.161	.260	1.589	-.777	.000						
S19	0.73	.443	.174	-.618	.486	-.822	.127	-.198	.000					
S18	0.73	-1.632	.384	1.568	-1.352	-.232	1.196	-.800	.680	.000				
S17	0.72	.668	.061	-.439	.328	-.046	-.536	.565	-.625	.067	.000			

Validity Analysis shows that CR = 0.915 and AVE= 0.520 are within the acceptable range hence no validity concern here.

4.5.2.2.3 Measurement and Validation of Value Scale

The result of the CFA (Figure no.4.10) model shows a Chi-square index of 120.097 with 27 degree of freedom i.e. a Normed Chi-square index of 4.448, GFI = 0.968; AGFI = 0.949; NFI = 0.965; CFI = 0.973; RMR = 0.082 and RMSEA = 0.066. Standardized residuals (Table no. 4.29).

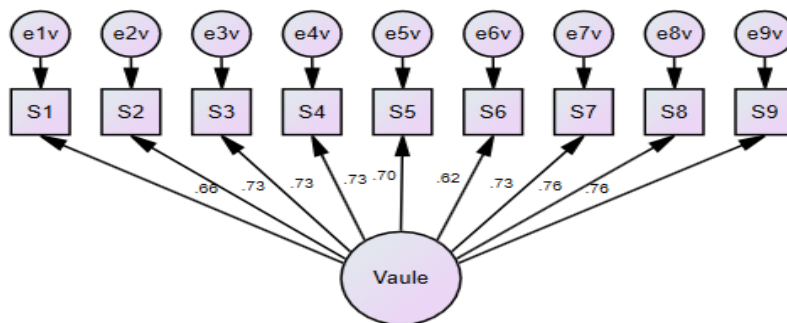


Figure no. 4.10: CFA Model for Value Scale

Table no. 4.29: Standardized Factor Loadings and Residuals for Value Scale

Item	Standardized factor loading	Standardized Residual Covariances								
		S9	S8	S7	S6	S5	S4	S3	S2	S1
S9	0.76	.000								
S8	0.76	-.699	.000							
S7	0.73	2.235	.339	.000						
S6	0.62	-1.126	-.193	-.238	.000					
S5	0.70	-.616	-.127	-.836	-.503	.000				
S4	0.73	-.438	.639	-.962	1.131	1.043	.000			
S3	0.73	.540	-.746	-.392	-.316	1.154	-.064	.000		
S2	0.73	.323	.025	-.284	-.214	.225	-.442	.104	.000	
S1	0.66	-.900	1.091	-.596	2.229	-.562	-.539	-.257	.212	.000

4.5.2.2.4 Measurement and Validation of Customer Delight Scale

The result of CFA (Figure no. 4.11) model reveals a Chi-square index of 1.970 with 1 degree of freedom i.e. a Normed Chi-square index of 1.970, GFI = 0.998; AGFI = 0.990; NFI = 0.997; CFI = 0.999; RMR = 0.054 and RMSEA = 0.035. Standardized residuals (Table no. 4.30).

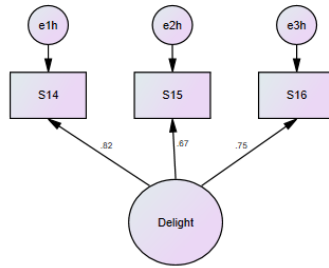


Figure no. 4.11: CFA Model for Delight Scale

Table no. 4.30: Standardized Factor Loadings and Residuals Customer Delight Scale

Item code	Standardized Factor Loadings	Standardized Residual Covariances		
		S16	S15	S14
S16	0.75	-.519		
S15	0.67	-.653	.000	
S14	0.82	-.133	.430	.383

Validity Analysis shows that CR = 0.793 and AVE = 0.563 are within the acceptable range hence no validity concern here.

4.5.2.2.5 Measurement and Validation of Experience Scale

The result of the CFA (Figure no. 4.12) model shows a Chi-square index of 3.172 with 3 degree of freedom i.e. a Normed Chi-square index of 1.057, GFI = 0.998; AGFI = 0.993; NFI = 0.997; CFI = 0.999; RMR = 0.063 and RMSEA = 0.008. Standardized residuals (Table no. 4.31).

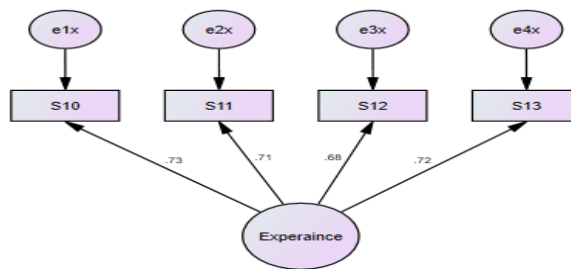


Figure no. 4.12: CFA Model for Experience Scale

Table no. 4.31: Standardized Factor Loading and Residual for Experience Scale

Item code	Standardized Factor Loadings	Standardized Residual Covariances			
		S13	S12	S11	S10
S13	0.72	-0.606			
S12	0.68	-0.661	0		

S11	0.71	-0.730	0.285	0	
S10	0.73	0.174	0.363	0.452	0.576

Validity Analysis shows that CR = 0.802 and AVE = 0.504 is within the acceptable range hence no validity concern here.

4.5.2.2.6 Measurement and Validation of Care Scale

The result of the uni-dimensional CFA model(Figure no. 4.13) for care scale reveals, a Chi-square index of 13.030 with 2 degree of freedom i.e. a Normed Chi-square index of 6.515, GFI = 0.992; AGFI = 0.959; NFI = 0.990; CFI = 0.991; RMR = 0.057 and RMSEA = 0.083.

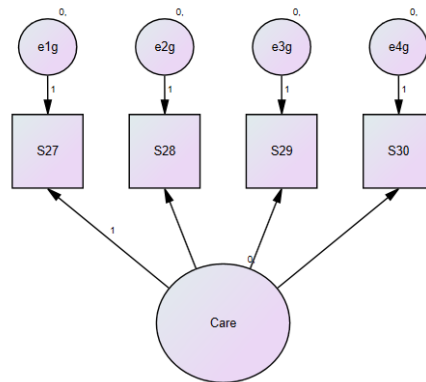


Figure no.4.13: CFA Model for Care Scale

Since the Normed Chi-square index is greater than 5, hence to improve the model fit indices modified indices are used.

Table no. 4.32: Modification Indices of Care Scale

	M.I.	Par Change
e3g <--> e4g	6.610	.140
e1g <--> e3g	4.569	-.138
e1g <--> e2g	4.854	.148

Revised Model for Care Scale

The result of revised the uni-dimensional CFA model (Figure no. 4.14) reveals a Chi-square index of 1.943 with 1 degree of freedom i.e., a Normed Chi-square index of 1.943, GFI = 0.999; AGFI = 0.988; NFI = 0.998; CFI = 0.999; RMR = 0.021 and RMSEA = 0.034. Revised standardized residuals (Table no. 4.33).

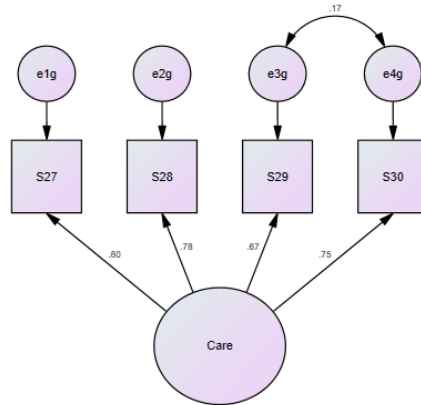


Figure no. 4.14: Revised CFA Model for Care Scale

Table no. 4.33: Revised Standardized Factor Loadings and Residuals for Care Scale

Item code	Standardized Factor Loadings	Standardized Residual Covariances			
		S30	S29	S28	S27
S30	0.75	0			
S29	0.67	0	0		
S28	0.78	-0.2	0.314	0	
S27	0.8	0.177	-0.278	0	0

Validity Analysis shows that CR = 0.835 and AVE = 0.560 is within the acceptable range hence no validity concern here.

Table no. 4.34: The CFA Report of Customer Satisfaction Construct

Construct	Item code	Factor loading	CR	AVE
Network	S17	0.71	0.915	0.52
	S18	0.73		
	S19	0.73		
	S20	0.75		
	S21	0.79		
	S22	0.7		
	S23	0.72		
	S24	0.6		
	S25	0.78		
	S26	0.69		
Value	S1	0.66	0.904	0.512
	S2	0.73		
	S3	0.73		
	S4	0.72		

	S5	0.7		
	S6	0.64		
	S7	0.73		
	S8	0.76		
	S9	0.76		
Care	S27	0.8	0.835	0.56
	S28	0.78		
	S29	0.67		
	S30	0.75		
Experience	S10	0.72	0.802	0.503
	S11	0.69		
	S12	0.69		
	S13	0.74		
Delight	S14	0.78	0.781	0.544
	S15	0.69		
	S16	0.74		

Table no. 4.35: Summary of Satisfaction Construct Model Fit Indices

Sr No	Parameter	Network	Value	Care	Experience	Delight
1	Normalised Chi-square (ratio of Chi-square to degrees of freedom)	3.593	4.448	1.943	1.057	1.97
2	Goodness-of-Fit Index (GFI)	0.968	0.968	0.999	0.998	0.998
3	Adjusted Goodness-of-Fit Index (AGFI)	0.949	0.949	0.988	0.993	0.99
4	Normalised Fit Index (NFI)	0.969	0.965	0.998	0.997	0.997
5	Comparative Fit Index (CFI)	0.977	0.973	0.999	0.999	0.999
6	Root Mean Square Residual (RMR)	0.084	0.082	0.021	0.063	0.054
7	Root Mean Square Error of Approximation (RMSEA)	0.057	0.066	0.034	0.008	0.035
8	Standardized Residuals less than 3.5	Yes	Yes	Yes	Yes	Yes
9	Standardized factor loadings (SFL) above 0.5	Yes	Yes	Yes	Yes	Yes
10	Average Variance Extracted (AVE)	0.52	0.508	0.56	0.504	0.563
11	Composite Reliability (CR)	0.915	0.903	0.835	0.802	0.793

4.5.2.3 Dimensionality of Customer Satisfaction

After the measurement and validation of various sub-dimensions of customer satisfaction, the dimensionality of the customer satisfaction construct has been assessed. There is a double opinion regarding the dimensionality of the customer satisfaction construct. One set of studies considers customer satisfaction as a uni-dimensional construct, whereas another set of studies has affirmed the multi-dimensionality of the construct of customer satisfaction. The

supporters of the uni-dimensional view of customer satisfaction (Chapman, 2003; Beatson *et al.*, 2006; Alam & Al-Amri, 2020) have considered the high degree of positive correlation between the different dimensions of customer satisfaction as a basis for uni-dimensionality. According to them, the focal dimensions of customer satisfaction are highly inter-correlated. Therefore, it is better to combine them into a single construct. On the other side, proponents of a multi-dimensional view of customer satisfaction (e.g., Kosciulek, 2003; Beatson *et al.*, 2006; Consuegra *et al.*, 2007; Andreis & Ferrari, 2014; VanScoyoc, 2019; Mu *et al.*, 2021) says that the different dimensions of customer satisfaction have a unique contribution toward customer's satisfaction. Both of the arguments have a sound theoretical basis. So, in the context of the present study, two separate CFA models i.e., customer satisfaction as a uni-dimensional construct and customer satisfaction as a multi-dimensional construct have been considered for the study.

4.5.2.3.1 Measurement and Validation of Customer Satisfaction (Multi-dimensional)

A CFA model of various dimensions of Customer satisfaction - construct (Figure no.4.15) has been developed and tested for its psychometric properties. The result of the model reveals a Chi-square index of 1396.460 with 397 degree of freedom i.e. a Normed Chi-square index of 3.558, GFI = 0.897; AGFI = 0.880; NFI = 0.895; CFI = 0.922; RMR = 0.138; RMSEA = 0.056 and SRMR =0.046 Standardized residuals (Table no. 4.36).

The model fit indices shows a Normed Chi-square index of 3.558(interpretation acceptable), GFI = 0.897; AGFI = 0.880; NFI = 0.895; CFI = 0.922 (value <0.90 Interpretation Acceptable); RMR = 0.138 and RMSEA = 0.056(value <0.06, interpretation Excellent). SRMR =0.046 (value <0.08, interpretation Excellent). As per Hu and Bentler (1999), the model can be considered a model fit and can be used for further analysis.

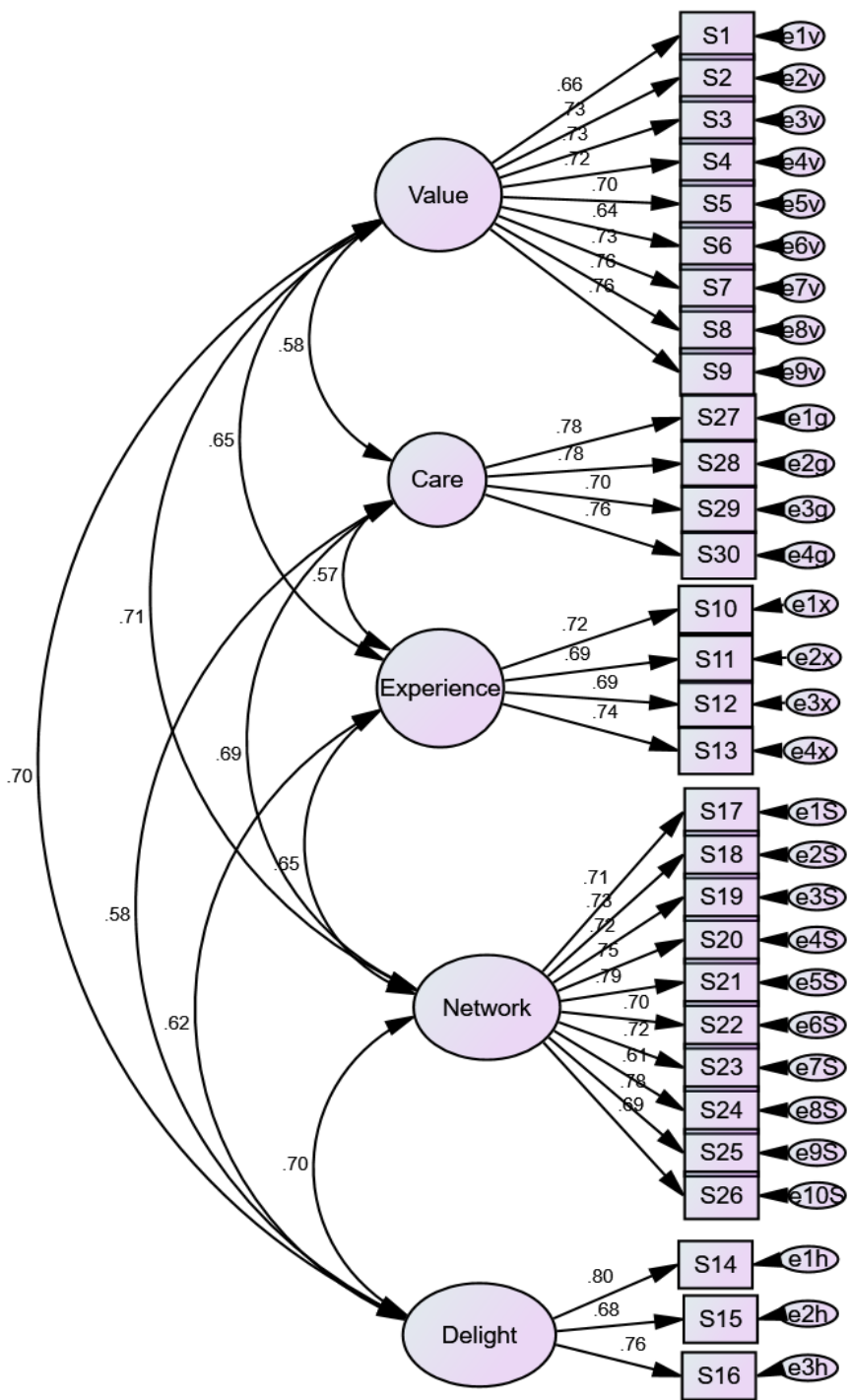


Figure no. 4.15: CFA model for Customer Satisfaction (Multi-dimensional) Construct

Table no. 4.36: Standardized Residual Covariances Customer Satisfaction (Multi-dimensional)

Standardized Residual Covariances																														
	S30	S29	S28	S27	S26	S25	S24	S23	S22	S21	S20	S19	S18	S17	S9	S8	S7	S6	S5	S4	S3	S2	S1	S13	S12	S11	S10	S16	S15	S14
S30	0																													
S29	1.2	0																												
S28	-0.6	-0.5	0																											
S27	0.3	-0.6	0.2	0																										
S26	0.1	1.3	1.2	0.4	0																									
S25	2.5	0.5	3.5	2	-1.2	0																								
S24	1.3	4.6	1.2	1.3	-0.6	-0.7	0																							
S23	-1.2	0.2	0.1	-1.5	0	0.1	-0.9	0																						
S22	-1.7	-2.3	-0.6	-1.7	1.4	-0.2	-0.1	-0.5	0																					
S21	-1.1	-1	-0.4	-1.1	-1.2	0.5	-0.1	0.6	-0.6	0																				
S20	-1.5	-0.7	-0.1	-0.3	0.8	-0.7	-0.5	0.4	1.8	-0.6	0																			
S19	0.4	-0.6	0.3	0.5	0.2	0.1	-0.9	0.6	-0.6	0.2	0	0																		
S18	-0.1	-0.9	0	0	-1.8	0.4	1.3	-1.2	0	1.3	-0.6	0.9	0																	
S17	-1.6	-0.2	0	-2.5	0.6	0.2	-0.6	0.6	0.3	-0.3	0.9	-0.4	0.4	0																
S9	0	1.5	0.8	-0.2	3.9	0.8	4.2	1.3	-0.4	2	1.5	0.7	0.6	1.6	0															
S8	-2.2	-1.7	0.8	-0.6	2.2	-0.9	1	-0.7	-0.3	0.1	-0.4	-1.7	-0.8	-0.1	-0.7	0														
S7	-0.5	0.5	-0.3	-1.9	2.7	-0.8	1.8	-0.8	-1.4	0.2	-0.4	-0.9	-1.7	-1.1	2.3	0.6	0													
S6	0.2	1.9	2.1	1.1	2.6	1.5	1.9	1.2	1.7	1.3	1.8	0.3	1	1.4	-1.6	-0.5	-0.5	0												
S5	-1.7	0.2	0.1	0	3	0	1.6	-1.5	1	-0.4	-1	-2.4	-0.3	-0.7	-0.7	0	-0.7	-0.9	0											
S4	-0.5	0.3	1.3	-1	2.1	-0.3	0.6	0.6	-0.3	-0.3	-0.3	-2.5	-1.6	0.5	-0.5	0.7	-0.8	0.7	1.1	0										
S3	0.1	1.7	0.1	1.2	3	-1.8	1.2	-2.3	-1.9	-1.4	-2.3	-2.2	-2	-2.5	0.5	-0.6	-0.2	-0.7	1.3	0	0									
S2	-1.4	0.8	0.3	-0.4	2.2	-0.6	2.2	0.5	0.2	-0.1	0	-1.2	-2.1	-2.4	0.3	0.2	-0.1	-0.6	0.3	-0.4	0.2	0								
S1	-1.1	1	-0.5	0.4	-0.9	-0.7	3.2	0.5	0.9	1.1	-2.3	-0.6	-0.3	-0.3	-1	1.2	-0.5	1.9	-0.5	-0.5	-0.2	0.3	0							
S13	1.1	0.5	1.2	1	1.3	0.6	4.6	0.8	0.1	0.7	-0.2	1.5	2.5	-0.2	1.8	0.4	1.5	2.9	0.1	-0.1	2.2	-0.1	0.5	0						
S12	-0.4	-1.1	-0.3	-0.8	-0.6	-1	0	-0.6	-0.8	0	-0.9	-1.1	0.9	-1.4	-0.7	-0.9	-0.9	1.1	-1.3	-1.4	-1.5	-2.1	-0.5	-1.1	-0.6					
S11	-0.7	-1.5	-0.1	-1.5	0	-2.5	1.3	-0.5	-1.8	-0.1	-1.6	-1.1	-0.1	-1.8	-0.3	0.3	-0.9	1.9	0.7	1.4	0.4	-0.4	1.7	-0.7	0.2	0				
S10	-1	1.3	0.2	0.8	0.3	-0.2	3.5	0.6	-1.2	0.1	0.2	1	0.3	-0.6	0.1	-1	-0.5	0.5	-1.6	-1.4	-0.3	-1.1	0.6	0.3	0.3	0.9	0.5			
S16	-1.7	-1.3	1.9	-0.4	1.7	1.5	1.3	1.8	1.4	1.2	1.2	0.9	0	0.7	-0.1	0.1	-0.6	3.4	1.2	0.5	0.3	1.1	-0.3	1.1	-0.1	0.2	-0.5	0.4		
S15	-1.2	-0.3	2	1.6	2.2	-0.8	-0.4	-0.3	1	0.9	0.4	-0.3	-1	-0.9	-1.7	-0.3	-1.3	3.7	0.5	0	0.7	0.1	-0.7	0.7	0.7	1.7	0.9	-0.8	0	
S14	-1.4	-1.2	1.1	0.2	-0.2	-1.2	-0.4	0.1	-0.5	-0.6	-1.5	-1	-1.9	-2.1	-1.1	-0.4	-1.5	1.6	-0.1	0.1	-0.1	0	-1.7	0	-1.2	-0.7	-1.1	0.3	0.3	-0.3

Table no. 4.37: Discriminant Validity Analysis of Customer Satisfaction (Multi-Dimensional) Constructs

	CR	AVE	MSV	MaxR(H)	Delight	Experience	Value	Network	Care
Delight	0.791	0.559	0.492	0.799	0.748				
Experience	0.802	0.503	0.426	0.803	0.624*	0.709			
Value	0.904	0.512	0.501	0.906	0.697*	0.648*	0.716		
Network	0.915	0.52	0.501	0.918	0.701*	0.653*	0.708*	0.721	
Care	0.842	0.572	0.482	0.845	0.580*	0.566*	0.585*	0.694*	0.756

Significance:*p < 0.001

Validity Analysis shows that CR is above 0.7 and AVE is above 0.50 is within the acceptable range. The diagonal value (in bold) in Table no. 4.37 is the square root of the average variance extracted for the factor whereas the rest values are the correlation between the respective factors or constructs. The discriminant validity is achieved when a diagonal value (in bold) is more than the values in its row and column. Referring to Table no. 4.34, we can say that the discriminant validity for all factors or constructs is achieved.

4.5.2.3.2 Measurement and Validation of Customer Satisfaction (Uni-Dimensional)

A uni-dimensional model for customer satisfaction construct (Figure no. 4.16) has been developed and tested for its psychometric properties. The result of the model reveals a Chi-square index of 1412.090 with 402 degree of freedom i.e. a Normed Chi-square index of 3.513, GFI = 0.896; AGFI = 0.880; NFI = 0.894; CFI = 0.921; RMR = 0.141 and RMSEA = 0.056. Standardized residuals (Table no. 4.38). The Normed Chi-square index (less than 5), CFI (greater than 0.9), and RMESA (less than 0.08) are in the acceptable range (Hu and Bentler,1999). Hence model can be considered a model fit and can be used for further analysis.

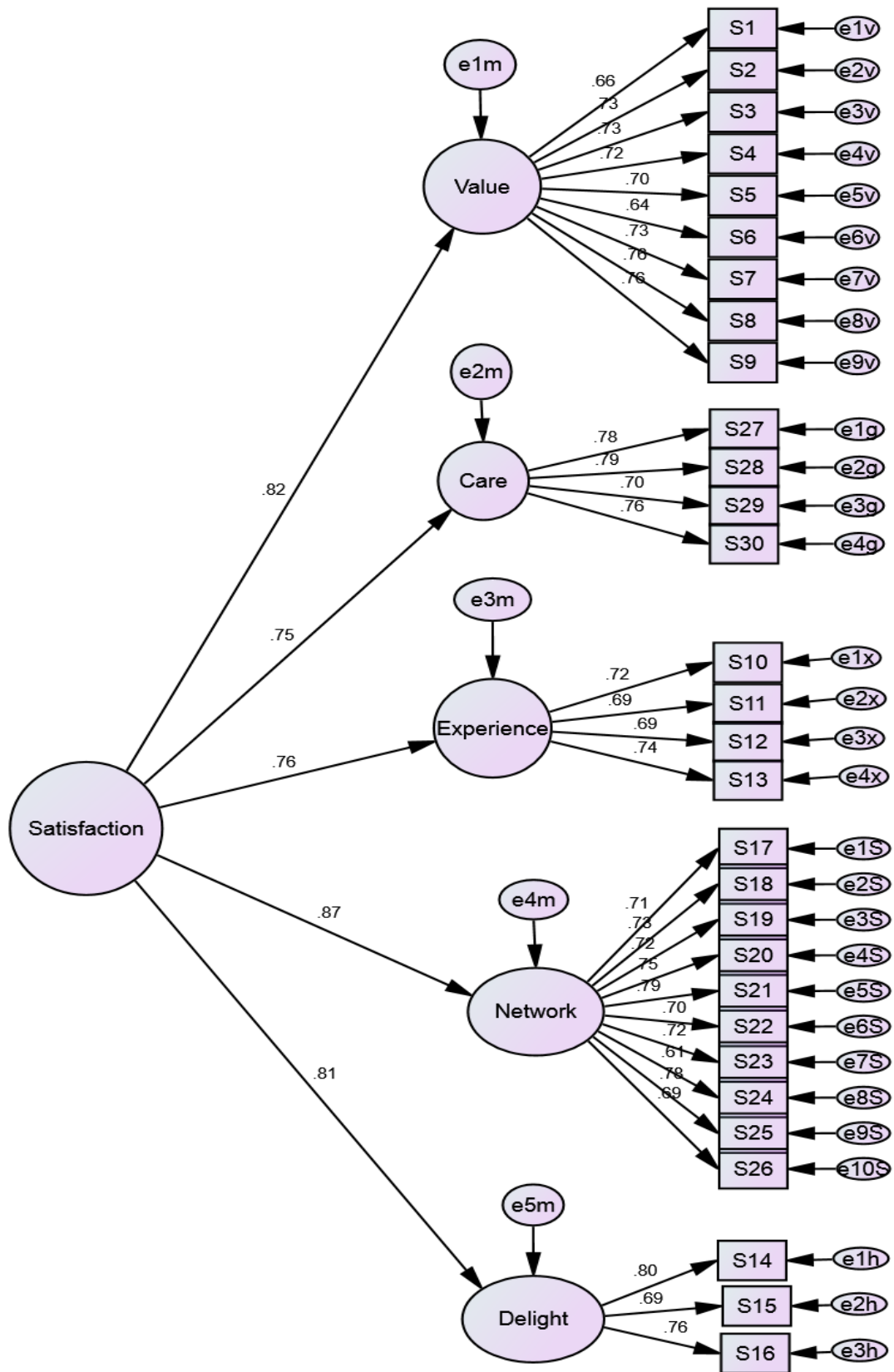


Figure no. 4.16: CFA model for Customer Satisfaction (Uni-Dimensional) Construct

Table no. 4.38: Standardized Residual Covariances Customer Satisfaction (Uni-dimensional)

Standardized Residual Covariances																														
	S30	S29	S28	S27	S26	S25	S24	S23	S22	S21	S20	S19	S18	S17	S9	S8	S7	S6	S5	S4	S3	S2	S1	S13	S12	S11	S10	S16	S15	S14
S30	0.0																													
S29	1.3	0.0																												
S28	-0.6	-0.5	0.0																											
S27	0.3	-0.6	0.2	0.0																										
S26	0.7	1.8	1.8	1.0	0.0																									
S25	3.2	1.1	4.2	2.7	-1.1	0.0																								
S24	1.9	5.1	1.7	1.8	-0.6	-0.7	0.0																							
S23	-0.6	0.7	0.7	-1.0	0.0	0.2	-0.9	0.0																						
S22	-1.1	-1.8	-0.1	-1.1	1.4	-0.2	-0.1	-0.6	0.0																					
S21	-0.5	-0.4	0.2	-0.5	-1.2	0.6	-0.1	0.5	-0.7	0.0																				
S20	-0.9	-0.1	0.5	0.3	0.8	-0.6	-0.5	0.4	1.8	-0.7	0.0																			
S19	1.0	-0.1	0.9	1.1	0.2	0.2	-0.9	0.6	-0.6	0.2	0.0	0.0																		
S18	0.5	-0.3	0.6	0.6	-1.8	0.4	1.3	-1.3	0.0	1.3	-0.6	0.9	0.0																	
S17	-1.0	0.3	0.5	-1.9	0.6	0.2	-0.6	0.5	0.2	-0.3	0.9	-0.4	0.4	0.0																
S9	-0.4	1.1	0.3	-0.7	3.8	0.7	4.1	1.2	-0.6	1.8	1.3	0.5	0.4	1.4	0.0															
S8	-2.6	-2.1	0.3	-1.1	2.0	-1.0	0.9	-0.8	-0.5	-0.1	-0.6	-1.8	-0.9	-0.2	-0.7	0.0														
S7	-0.9	0.1	-0.8	-2.4	2.6	-0.9	1.7	-1.0	-1.5	0.1	-0.5	-1.0	-1.8	-1.3	2.2	0.6	0.0													
S6	-0.2	1.6	1.7	0.6	2.5	1.5	1.8	1.1	1.6	1.1	1.7	0.2	0.9	1.3	-1.6	-0.5	-0.5	0.0												
S5	-2.1	-0.2	-0.3	-0.5	2.8	-0.1	1.5	-1.7	0.9	-0.6	-1.2	-2.5	-0.4	-0.8	-0.7	0.0	-0.7	-0.8	0.0											
S4	-0.9	-0.1	0.8	-1.5	1.9	-0.4	0.5	0.4	-0.4	-0.5	-0.4	-2.6	-1.8	0.3	-0.5	0.8	-0.8	0.8	1.1	0.0										
S3	-0.3	1.2	-0.4	0.7	2.9	-1.9	1.1	-2.5	-2.0	-1.6	-2.4	-2.3	-2.2	-2.6	0.5	-0.6	-0.2	-0.6	1.3	0.0	0.0									
S2	-1.9	0.4	-0.2	-0.9	2.1	-0.7	2.1	0.3	0.0	-0.3	-0.2	-1.3	-2.2	-2.5	0.2	0.2	-0.1	-0.5	0.3	-0.4	0.2	0.0								
S1	-1.5	0.6	-1.0	-0.1	-1.0	-0.8	3.1	0.3	0.8	0.9	-2.4	-0.7	-0.5	-0.5	-1.0	1.2	-0.5	1.9	-0.5	-0.5	-0.2	0.3	0.0							
S13	1.0	0.4	1.1	0.9	1.1	0.4	4.4	0.6	-0.2	0.4	-0.4	1.3	2.3	-0.4	2.1	0.7	1.8	3.2	0.4	0.2	2.6	0.2	0.7	0.0						
S12	-0.5	-1.1	-0.4	-0.9	-0.8	-1.2	-0.2	-0.8	-1.0	-0.2	-1.1	-1.3	0.7	-1.6	-0.4	-0.7	-0.7	1.3	-1.1	-1.1	-1.2	-1.8	-0.3	-1.1	-0.6					
S11	-0.7	-1.5	-0.1	-1.6	-0.2	-2.7	1.2	-0.7	-2.0	-0.3	-1.8	-1.2	-0.3	-2.0	0.0	0.6	-0.6	2.2	1.0	1.7	0.7	-0.1	2.0	-0.6	0.2	0.0				
S10	-1.1	1.2	0.1	0.7	0.1	-0.4	3.3	0.4	-1.4	-0.2	0.0	0.8	0.1	-0.8	0.4	-0.7	-0.3	0.8	-1.3	-1.1	0.0	-0.9	0.8	0.3	0.3	0.9	0.5			
S16	-2.1	-1.7	1.5	-0.9	1.5	1.4	1.2	1.6	1.3	1.0	1.1	0.7	-0.2	0.6	0.3	0.6	-0.2	3.9	1.6	1.0	0.8	1.5	0.1	1.1	-0.1	0.3	-0.5	0.4		
S15	-1.6	-0.7	1.5	1.2	2.1	-0.9	-0.5	-0.5	0.9	0.8	0.2	-0.4	-1.1	-1.1	-1.4	0.1	-1.0	4.0	0.8	0.3	1.1	0.5	-0.3	0.7	0.7	1.8	0.9	-0.8	0.0	
S14	-1.8	-1.6	0.6	-0.3	-0.3	-1.2	-0.5	-0.1	-0.6	-0.7	-1.7	-1.1	-2.1	-2.3	-0.6	0.0	-1.1	2.1	0.3	0.5	0.4	0.4	-1.3	0.0	-1.1	-0.6	-1.1	0.3	0.3	-0.3

The analysis (Table no 4.39) shows that CR is above 0.7 and AVE is above 0.50 is within the acceptable range.

Table no. 4.39: The CFA Report of Customer Satisfaction (Uni-Dimensional) Construct

Construct	Sub Construct/ Dimension	Item code	Factor loading for sub construct	Factor loading for sub construct	CR construct	CR sub construct	AVE construct	AVE sub construct
Satisfaction	Network	S17	0.87	0.712	0.901	0.915	0.645	0.521
		S18		0.726				
		S19		0.724				
		S20		0.749				
		S21		0.787				
		S22		0.725				
		S23		0.606				
		S24		0.781				
		S25		0.69				
		S26		0.699				
	Value	S1	0.82	0.656				
		S2		0.731				
		S3		0.729				
		S4		0.724				
		S5		0.700				
		S6		0.640				
		S7		0.727				
		S8		0.759				
		S9		0.763				
	Care	S27	0.75	0.778				
		S28		0.786				
		S29		0.699				
		S30		0.757				
	Experience	S10	0.76	0.721				
		S11		0.692				
		S12		0.686				
S13		0.737						
Delight	S14	0.81	0.797					
	S15		0.685					
	S16		0.756					

Table no. 4.40: Summary of Satisfaction (Uni-Dimensional) Construct Model Fit Indices

Sr no	Parameter	Model fit indices
1	Normalised Chi-square (ratio of Chi-square to degrees of freedom)	3.513
2	Goodness-of-Fit Index (GFI)	0.896
3	Adjusted Goodness-of-Fit Index (AGFI)	0.880
4	Normalised Fit Index (NFI)	0.894
5	Comparative Fit Index (CFI)	0.921
6	Root Mean Square Residual (RMR)	0.141
7	Root Mean Square Error of Approximation (RMSEA)	0.056
8	Standardized Residuals	Less than 3.5
9	Standardized Factor Loadings (SFL)	Above 0.5
10	Average Variance Extracted (AVE)	Above 0.5
11	Composite Reliability (CR)	Above 0.6

4.5.3 Exploratory Factor Analysis (EFA) and Confirmatory Factor (CFA) Analysis for Customer Churn Constructs

The exploratory factor analysis and confirmatory factor analysis of the customer churn construct customer churn is presented below

4.5.3.1 Exploratory Factor Analysis of Customer Churn Constructs

The SPSS output for factor analysis for customer churn is shown below

Table no.4.41: Initial Eigenvalues Customer Churn Constructs

Component	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	4.395	24.418	24.418
2	2.838	15.769	40.187
3	2.646	14.698	54.885
4	2.398	13.324	68.208
5	2.084	11.579	79.787
6	1.459	8.104	87.890
7	.550	3.058	90.948
8	.508	2.821	93.770
9	.333	1.848	95.618
10	.210	1.166	96.784
11	.154	.856	97.640
12	.118	.654	98.294

13	.102	.568	98.862
14	.088	.489	99.351
15	.051	.283	99.634
16	.035	.195	99.829
17	.017	.097	99.926
18	.013	.074	100.000

Table no. 4.42: Total Variance Explained Customer Churn Construct

Component	Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.395	24.418	24.418	2.943	16.349	16.349
2	2.838	15.769	40.187	2.908	16.158	32.506
3	2.646	14.698	54.885	2.787	15.485	47.992
4	2.398	13.324	68.208	2.634	14.635	62.627
5	2.084	11.579	79.787	2.420	13.445	76.072
6	1.459	8.104	87.890	2.127	11.819	87.890

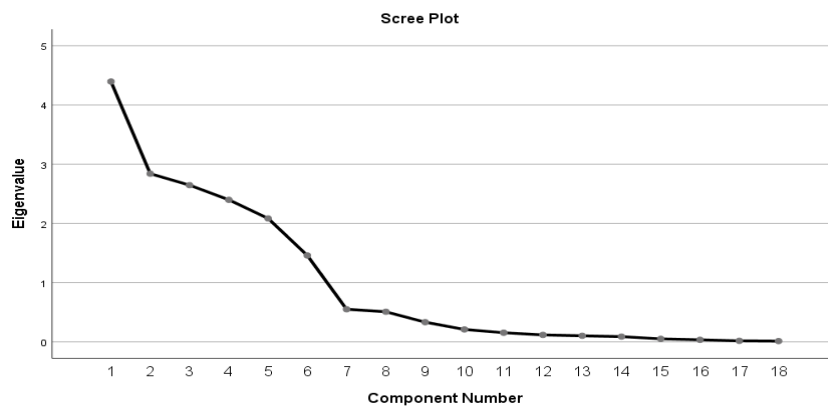


Figure no. 4.17: Scree Plot of Customer Churn Constructs

The above analysis (Table no. 4.41) shows that six factors have greater than one eigenvalue. So, it was concluded that considering Kaiser Criterion (Eigenvalue greater than one) the analysis can be carried out with six factors. The correlation matrix (principal component analysis) indicates that 87.890 per cent of the total variation is explained by six factors only.

Table no. 4.43: Rotated Component Matrix of Customer Churn Constructs

	Component					
	1	2	3	4	5	6
CN2	.960	.234	-.043	.018	-.003	.021
CN1	.959	.258	-.037	.024	.000	.022
CN3	.944	.272	-.017	.013	.000	.018

CE1	.271	.954	-.010	.001	-.020	-.008
CE3	.258	.949	-.002	.002	-.007	-.014
CE2	.227	.947	.005	-.001	-.018	.011
CV1	.017	-.021	.971	-.006	.021	.013
CV2	-.011	-.004	.960	.009	.029	.007
CV3	-.094	.018	.957	-.019	.029	-.018
CF3	-.011	.013	.007	.952	.004	.033
CF2	.004	.011	-.009	.932	-.022	-.002
CF1	.054	-.021	-.013	.923	-.039	-.014
CA1	.007	-.027	.008	-.009	.951	-.017
CA2	.021	-.008	.031	-.001	.943	-.028
CA3	-.027	-.004	.032	-.041	.787	-.034
CB2	.061	-.020	.016	.011	-.030	.890
CB3	.014	.047	.009	.043	-.041	.824
CB1	-.024	-.034	-.022	-.038	-.006	.806

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

4.5.3.1.1 Explanation of the Factors Derived for Customer Churn

Factor 1: Network Quality: This factor of customer churn contributes to a 16.349 per cent variance. This factor consists of data speed, network coverage, and voice calls. As all these items are inclined towards the quality of the network so this factor is named as network quality. High factor loadings (> 0.5) for various scale items justify their significance.

Factor 2: Service: This factor of customer churn contributes to a 16.158 per cent variance. This factor consists of complex and inconvenient process, cumbersome documentation process, the activation formalities. As all these items are inclined towards service so this factor is named as service. High factor loadings (> 0.5) for various scale items justify their significance.

Factor 3: Product Value: This factor of customer churn contributes to a 15.485 per cent variance. This factor consists of value-added services, tariffs, and birthday/surprise gifts. As all these items are inclined towards product value given by the mobile service provider to the customer so this factor is named product value. High factor loadings (> 0.5) for various scale items justify their significance.

Factor 4: Social Influence: This factor of customer churn contributes to a 14.635 per cent variance. This factor consists of corporate/family/colleagues. As all these items are inclined

towards social so this factor is named social influence High factor loadings (> 0.5) for various scale items justify their significance.

Factor 5: Advertisement: This factor of customer churn contributes to a 13.445 per cent variance. This factor consists of the best promotional/best advertisement campaign. As all these items are inclined towards the advertisement of the company so this factor is named as an advertisement. High factor loadings (> 0.5) for various scale items justify their significance.

Factor 6: Brand: This factor of customer churn contributes to 11.819 per cent variance. This factor consists of brand trust, experience and quality. As all these items are inclined towards brand so this factor is named as a brand. High factor loadings (> 0.5) justify the significance of scale items.

4.5.3.1.2 Statistical Significance of the Factor Analysis

The statistical significance of the factor analysis can be confirmed with Cronbach’s alpha the same is tabulated for all six factors as below

Table no. 4.44: Reliability Test for Customer Churn Construct

Factor Name	Cronbach's Alpha	Number of Items
Network quality	0.98	3
Service	0.98	3
Product Value	0.96	3
Social influence	0.92	3
Advertisement	0.87	3
Brand	0.78	3

4.5.3.2 Confirmatory Factor Analysis of Customer Churn Constructs

The factors derived from the exploratory factor analysis are used for the confirmatory factor analysis with another set of 800 respondents. The confirmatory factor analysis for customer churn constructs is described below

4.5.3.2.1 Measurement and Validation of Customer Churn Construct

The below section presents the CFA model for customer churn construct along with discriminant validity.

4.5.3.2 Measurement and Validation of Network Quality Scale

CFA model (Figure no. 4.18) is developed from the factors derived from exploratory factor analyses. The result of the CFA model reveals a Chi-square index of 7.955 with 2 degree of freedom i.e. a Normed Chi-square index of 3.978, GFI = 0.974; AGFI = 0.981; NFI = 0.991; CFI = 0.993; RMR = 0.185 and RMSEA = 0.061. Standardized residuals (Table 4.45).

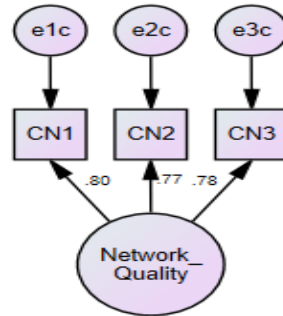


Figure no.4.18: CFA Model for Network Quality Scale

Table no. 4.45: Standardized Residual Covariances for Network Quality Scale

Item code	Standardized Factor Loadings	Standardized Residual Covariances		
		CN3	CN2	CN1
CN3	0.78	-.144		
CN2	0.77	-1.192	-1.036	
CN1	0.80	.887	.024	1.061

Validity Analysis shows that CR = 0.826 and AVE = 0.612 is within the acceptable range hence no validity concern here.

4.5.3.2.3 Measurement and Validation of Service Scale

CFA model (Figure no. 4.19) is developed from the factors derived from exploratory factor analyses. The result of the CFA model reveals a Chi-square index of 10.357 with 2 degree of freedom i.e. a Normed Chi-square index of 5.179, GFI = 0.986; AGFI = 0.975; NFI = 0.981; CFI = 0.986; RMR = 0.074 and RMSEA = 0.072. Standardized residuals (Table 4.46).

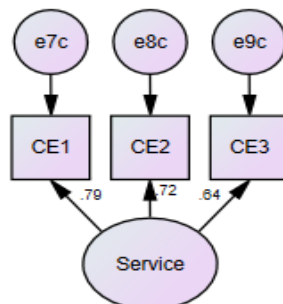


Figure no.4.19: CFA Model for Service Scale

Table no. 4.46: Standardized Residual Covariances for Service Scale

Item code	Standardized Factor Loadings	Standardized Residual Covariances		
		CE3	CE2	CE1
CE3	0.64	1.472		
CE2	0.72	.714	-.957	
CE1	0.79	1.598	-1.246	-.193

Validity Analysis shows that CR = 0.761 and AVE = 0.517 is within the acceptable range hence no validity concern here.

4.5.3.2.4 Measurement and Validation of Product Value Scale

CFA model (Figure no. 4.20) is developed from the factors derived from exploratory factor analyses. The result of the CFA model reveals a Chi-square index of 6.565 with 2 degree of freedom i.e. a Normed Chi-square index of 3.293, GFI = 0.995; AGFI = 0.984; NFI = 0.991; CFI = 0.993; RMR = 0.139 and RMSEA = 0.054. Standardized residuals (Table 4.47).

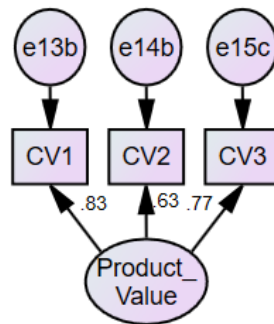


Figure no.4.20: CFA Model for Product Value Scale

Table no. 4.47: Standardized Residual Covariances for Product Value Scale

Item code	Standardized Factor Loadings	Standardized Residual Covariances		
		CV3	CV2	CV1
CV3	0.77	-.553		
CV2	0.63	-1.534	-.609	
CV1	0.83	.153	.130	.718

Validity Analysis shows that CR = 0.790 and AVE = 0.560 is within the acceptable range hence no validity concern here.

4.5.3.2.5 Measurement and Validation of Social Influence Scale

CFA model (Figure no. 4.21) is developed from the factors derived from exploratory factor analyses. The result of the CFA model reveals a Chi-square index of 3.172 with 1 degree of freedom i.e. a Normed Chi-square index of 3.172, GFI = 0.997; AGFI = 0.984; NFI = 0.997; CFI = 0.998; RMR = 0.093 and RMSEA = 0.052. Standardized residuals (Table 4.48).

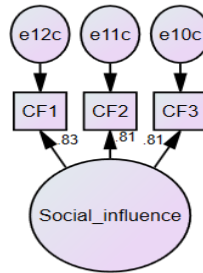


Figure no.4.21: CFA Model for Social Influence Scale

Table no. 4.48: Standardized Residual Covariances for Social Influence Scale

Item code	Standardized Factor Loadings	Standardized Residual Covariances		
		CF3	CF2	CF1
CF3	0.81	.705		
CF2	0.81	.632	.000	
CF1	0.83	.048	-.567	-.650

Validity Analysis shows that CR = 0.858 and AVE = 0.668 is within the acceptable range hence no validity concern here.

4.5.3.2.6 Measurement and Validation of Advertisement Scale

CFA model (Figure no. 4.22) is developed from the factors derived from exploratory factor analyses. The result of the CFA model reveals a Chi-square index of 7.503 with 2 degree of freedom i.e. a Normed Chi-square index of 3.752, GFI = 0.994; AGFI = 0.981; NFI = 0.993; CFI = 0.995; RMR = 0.083 and RMSEA = 0.059. Standardized residuals (Table no.4.49)

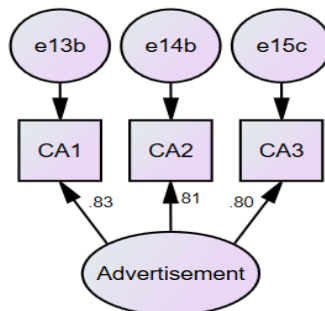


Figure no.4.22: CFA Model for Advertisement Scale

Table no. 4.49: Standardized Residual Covariances for Advertisement Scale

Item code	Standardized Factor Loadings	Standardized Residual Covariances		
		CA3	CA2	CA1
CA3	0.80	-1.210		
CA2	0.81	-.244	.943	
CA1	0.83	-.884	1.002	.207

Validity Analysis shows that CR = 0.855 and AVE = 0.664 is within the acceptable range hence no validity concern here.

4.5.3.2.7 Measurement and Validation of Brand Scale

CFA model (Figure no. 4.23) is developed from the factors derived from exploratory factor analyses. The result of the CFA model reveals a Chi-square index of 3.329 with 1 degree of freedom i.e. a Normed Chi-square index of 3.329, GFI = 0.997; AGFI = 0.983; NFI = 0.994; CFI = 0.996; RMR = 0.058 and RMSEA = 0.054. Standardized residuals (Table no. 4.50).

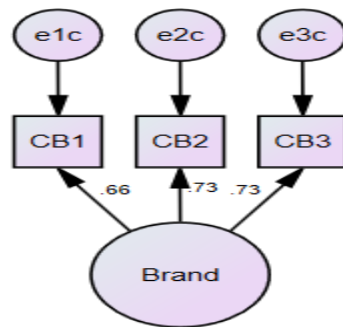


Figure no.4.23: CFA Model for Brand Scale

Table no. 4.50: Standardized Residual Covariances for Brand Scale

Item code	Standardized Factor Loadings	Standardized Residual Covariances		
		CB3	CB2	CB1
CB3	0.73	-.594		
CB2	0.73	.005	.599	
CB1	0.66	-.786	.796	.000

Validity Analysis shows that CR = 0.750 and AVE = 0.501 is within the acceptable range hence no validity concern here.

Table no. 4.51: Model Fit Indices Churn Construct Summary

Sr No	Parameter	Network Quality	Service	Product Value	Social Influence	Advertisement	Brand
1	Normalised Chi-square (ratio of Chi-square to degrees of freedom)	3.978	5.179	3.293	3.172	3.752	3.329
2	Goodness-of-Fit Index (GFI)	0.974	0.986	0.995	0.997	0.994	0.997
3	Adjusted Goodness-of-Fit Index (AGFI)	0.981	0.975	0.984	0.984	0.981	0.983
4	Normalised Fit Index (NFI)	0.991	0.981	0.991	0.997	0.993	0.994
5	Comparative Fit Index (CFI)	0.993	0.986	0.993	0.998	0.995	0.996
6	Root Mean Square Residual (RMR)	0.185	0.074	0.139	0.093	0.083	0.058
7	Root Mean Square Error of Approximation (RMSEA)	0.061	0.072	0.054	0.052	0.059	0.058
8	Standardized Residuals less than 3.5	Yes	Yes	Yes	Yes	Yes	Yes
9	Standardized factor loadings (SFL) above 0.5	Yes	Yes	Yes	Yes	Yes	Yes
10	Average Variance Extracted (AVE)	0.612	0.517	0.560	0.668	0.664	0.501
11	Composite Reliability (CR)	0.826	0.761	0.790	0.858	0.855	0.750

4.5.3.3 Measurement and Validation of Customer Churn

The result of the CFA model (Figure no. 4.24) shows a Chi-square index of 296.233 with 124 degree of freedom i.e. a Normed Chi-square index of 2.389, GFI = 0.961; AGFI = 0.946; NFI = 0.942; CFI = 0.965; RMR = 0.195 and RMSEA = 0.042, Standardized residuals (Table no. 4.52).

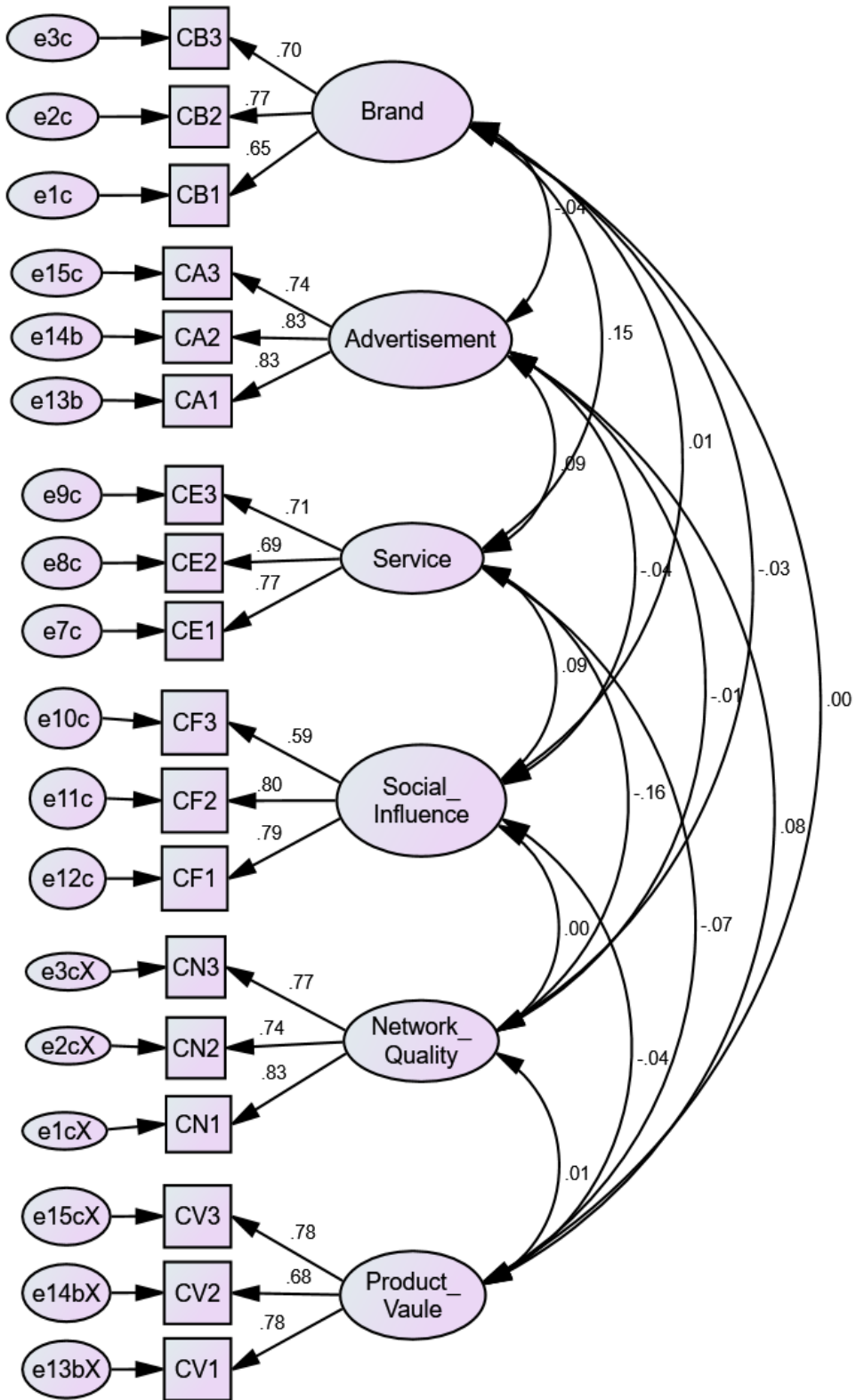


Figure no. 4.24: CFA for Customer Churn Construct

Table no. 4.52: Standardized Residual Covariances Customer Churn

Standardized Residual Covariances																		
	CN1	CV3	CV2	CV1	CN3	CN2	CF3	CF2	CF1	CE3	CE2	CE1	CA3	CA2	CA1	CB3	CB2	CB1
CN1	0.0																	
CV3	-1.1	-0.4																
CV2	1.3	-3.0	-2.1															
CV1	-0.4	1.6	-0.2	2.0														
CN3	0.0	-0.5	1.6	-0.7	0.0													
CN2	0.0	-0.4	1.2	0.8	0.0	0.0												
CF3	0.0	-0.1	0.8	-0.4	-0.5	-0.6	7.9											
CF2	-0.4	0.2	0.1	-0.8	0.1	-0.6	9.8	3.1										
CF1	0.1	-0.4	0.4	-0.7	0.8	0.6	9.9	3.0	3.0									
CE3	-0.2	-0.3	-1.8	0.6	-0.2	-0.8	0.6	0.7	0.1	0.0								
CE2	-0.2	0.7	-0.6	-0.5	-0.9	-0.5	1.4	1.7	0.6	-0.2	0.0							
CE1	0.7	0.5	-1.5	1.1	0.6	0.6	0.1	0.1	-0.3	0.1	0.1	0.0						
CA3	-0.3	-0.2	1.1	0.6	-0.8	-0.6	-1.3	-0.5	0.2	1.4	0.0	-0.6	1.8					
CA2	0.7	0.4	0.6	0.1	-0.6	0.0	-1.0	0.0	-0.5	0.8	-0.9	-0.9	1.9	0.9				
CA1	0.5	-0.3	0.0	-0.5	-0.7	0.5	-0.6	-0.5	0.4	1.2	-0.4	0.5	1.9	0.9	0.9			
CB3	0.8	0.4	-2.0	1.1	1.7	1.4	2.0	-0.1	1.5	-0.3	-0.6	-0.3	-0.5	-1.2	-0.2	0.0		
CB2	-1.0	0.0	-1.1	0.8	-0.6	-0.6	0.9	0.2	-0.7	0.6	0.7	0.8	0.7	0.4	0.7	0.0	0.0	
CB1	-1.1	-0.2	-1.6	0.8	0.1	1.3	-0.2	-0.5	-1.4	-1.2	-0.3	-0.7	-0.2	-0.3	-0.6	0.1	0.0	0.0

Validity Analysis shows that CR is above 0.7, AVE is above 0.50 is within the acceptable range for all constructs. The diagonal value (in bold) in Table no. 4.53 is the square root of the Average Variance Extracted for the factor whereas the rest values are the correlation between the respective factors or constructs. The discriminant validity is achieved when a diagonal value (in bold) is more than the values in its row and column. Referring to Table no. 4.53, we can say that the discriminant validity for all factors or constructs is achieved.

Table no. 4.53: Discriminant Validity Analysis of Customer Churn Construct

	CR	AVE	MSV	MaxR(H)	Brand	Advertisement	Service	Social Influence	Network Quality	Product Value
Brand	0.751	0.503	0.022	0.760	0.709					
Advertisement	0.841	0.639	0.007	0.848	-0.037	0.800				
Service	0.768	0.524	0.025	0.772	0.149**	0.086†	0.724			
Social Influence	0.774	0.537	0.009	0.799	0.006	-0.045	0.095*	0.733		
Network Quality	0.825	0.612	0.025	0.832	-0.033	-0.006	-0.157***	0.003	0.782	
Product Value	.790	0.557	0.006	0.796	0.001	0.076†	-0.067	-0.042	0.008	0.746

Significance of Correlations: † $p < 0.100$, * $p < 0.050$, ** $p < 0.010$, *** $p < 0.001$

CHAPTER – V
ASSOCIATION OF CUSTOMER ENGAGEMENT AND CUSTOMER
SATISFACTION WITH CUSTOMER DEMOGRAPHICS

To test the association of customer engagement and satisfaction with the demographics of the customer (i.e., gender, age, education and occupation), the Chi-square test of independence has been applied. The Chi-square test of independence assesses the degree of association between the two categorical variables, it is non-parametric in nature.

The decision rule used for the hypotheses testing are taken as below

- The Alpha value is taken as 0.05
- Fail to reject hypotheses, if the p-value is greater than Alpha
- Reject hypotheses, if the p-value is less than to Alpha

To conduct the Chi-square test, the degree of customer engagement and satisfaction is calculated on the summated score of these constructs. The customer response of each factor under the given construct is summed to get the summated score for the construct. The scores are categorised as low, moderate and high based on the summated score scale.

In order to test the association between customer demographics and customer engagement and satisfaction following null hypotheses are proposed.

Association between customer demographics and customer engagement

- There is no significant association of gender with customer engagement
- There is no significant association of age with customer engagement
- There is no significant association of education with customer engagement
- There is no significant association of occupation with customer engagement

Association between customer demographics and customer satisfaction

- There is no significant association of gender with satisfaction
- There is no significant association of age with customer satisfaction
- There is no significant association of education with customer satisfaction
- There is no significant association of occupation with customer satisfaction

The association was tested with customer engagement and satisfaction on uni-dimensional and multi-dimensional constructs.

5.1: ASSOCIATION OF CUSTOMER ENGAGEMENT (UNI-DIMENSIONAL) AND CUSTOMER DEMOGRAPHICS

To conduct the Chi-square test for the association of customer engagement (uni-dimensional) and customer demographics, the degree of customer engagement is calculated on the summated score of these constructs. The customer response on customer engagement constructs (thirteen attributes) is summed to get the summated score for the construct. The scores are categorised as low, moderate and high. The categorisation of the summated score is as shown in Table no. 5.1.

Table no.5.1 Categorization of Summated Score Customer Engagement (Uni-dimensional)

Construct	Degree	Score	Max and Min range
Engagement	Low	Up to 44	Min = 13, Max=91
	Moderate	45-68	
	High	Greater than 68	

The following hypotheses were tested with the Chi-square test to test the association between customer demographics and customer engagement as uni-dimensional constructs

H1: The gender of the customer is not significantly associated with the degree of customer engagement (Uni-dimensional).

H2: The age of the customer is not significantly associated with the degree of customer engagement (Uni-dimensional).

H3: Customer education is not significantly associated with the degree of customer engagement (Uni-dimensional).

H4: Customer occupation is not significantly associated with the degree of customer engagement (Uni-dimensional).

Table no. 5.2 Association between Customer Demographics and Degree of Customer Engagement (Uni-dimensional)

Association between customer gender and degree of customer engagement									
Parameter	Classification	Degree of customer engagement			Total	Chi-square	DF	P-Value	Hypotheses decision
		Low	Moderate	High					
Gender	Male	107	275	451	833	2.49	2	0.008	Reject
	Female	82	260	425	767				
	Total	189	535	876	1600				

Association between customer age bracket and degree of customer engagement									
Parameter	Classification	Degree of customer engagement			Total	Chi-square	DF	P-Value	Hypotheses decision
		Low	Moderate	High					
Age Bracket	18-25	79	254	367	700	10.1	4	0.380	Fail to Reject
	26-59	84	209	379	672				
	60+	26	72	130	228				
	Total	189	535	876	1600				
Association between education and degree of customer engagement									
Parameter	Classification	Degree of customer engagement			Total	Chi-square	DF	P-Value	Hypotheses decision
		Low	Moderate	High					
Education	No formal education	6	32	31	69	7.02	6	0.019	Reject
	Up to schooling (10 th)	86	245	412	743				
	Graduate	85	219	360	664				
	Postgraduate	12	39	73	124				
	Total	189	535	876	1600				
Association between occupation and degree of customer engagement									
Parameter	Classification	Degree of customer engagement			Total	Chi-square	DF	P-Value	Hypotheses decision
		Low	Moderate	High					
Occupation	Housewife	63	164	290	517	6.06	10	0.011	Reject
	Salary	51	154	230	435				
	Farmer	13	40	71	124				
	Business	44	112	176	332				
	Other	18	65	109	192				
	Total	189	535	876	1600				

The Chi-square test results on the collected data in Table no. 5.2 reveals that the customer's demographics like gender (Chi-square = 2.49 with p-value = 0.008), education (Chi-square =7.02 with a p-value of 0.019) and occupation (Chi-square =6.06 with p-value of 0.011) are significantly associated with customer engagement (Uni- dimensional). The age bracket of the customer (Chi-square =10.1 with p-value = 0.380) is not significantly associated with customer engagement (Uni-dimensional).

5.2 ASSOCIATION BETWEEN CUSTOMER ENGAGEMENT (MULTI-DIMENSIONAL) AND CUSTOMER DEMOGRAPHICS

The factors which were derived after EFA and CFA of customer engagement named human-based customer engagement and machine-based customer engagement are taken to test the association with the customer demographics.

The Chi-square test has been used to test the following hypotheses on the customer engagement (multi-dimension) and demographic details

H5: The gender of the customer is not significantly associated with the degree of human-based customer engagement.

H6: Age of the customer is not significantly associated with the degree of human-based customer engagement.

H7: Customer education is not significantly associated with the degree of human-based customer engagement.

H8: Customer occupation is not significantly associated with the degree of human-based customer engagement.

H9: The gender of the customer is not significantly associated with the degree of machine-based customer engagement.

H10: The age of the customer is not significantly associated with the degree of machine-based customer engagement.

H11: Customer education is not significantly associated with the degree of machine-based customer engagement.

H12: Customer occupation is not significantly associated with the degree of machine-based customer engagement.

To conduct the Chi-square test for the association of customer engagement (unidimensional) and customer demographics, the degree of customer engagement is calculated on the summated score of these constructs. The customer response of two factors human-based customer engagement (six attributes) and machine-based customer engagement (seven attributes) under the given construct is summed to get the summated score for the construct. The scores are categorised as low, moderate and high based on the summated score scale. The categorisation of the summated score is as shown in Table no. 5.3.

Table no.5.3 Categorization of a Summated Score of Customer Engagement (Multi-dimension)

Factor	Degree of Customer Engagement	Score	Max and Min range
Human-based customer engagement	Low	Up to 21	Min = 6, Max=42
	Moderate	22-31	
	High	Greater than 32	
Machine-based customer engagement	Low	Up to 25	Min =7, Max= 49
	Moderate	26-36	
	High	Greater than 37	

Table no.5.4(a) Association between Customer Demographics and Engagement (Multi-Dimensional) Human-Based Customer Engagement

Association between customer demographics and degree of human-based customer engagement									
Parameter	Classification	Degree of human-based customer engagement			Total	Chi-square	DF	P-Value	Hypotheses decision
		Low	Moderate	High					
Gender	Male	137	187	482	806	0.731	2	0.004	Reject
	Female	146	174	474	794				
	Total	283	361	956	1600				
Age Bracket	18-25	132	184	404	720	10.3	4	0.357	Fail to Reject
	26-59	109	139	407	655				
	60+	42	38	145	225				
	Total	283	361	956	1600				
Education	No formal education	11	24	34	69	11.9	6	0.006	Reject
	Up to schooling (10 th)	135	148	460	743				
	Graduate	116	165	383	664				
	Postgraduate	21	24	79	124				
	Total	283	361	956	1600				
Occupation	Housewife	91	113	313	517	4.01	10	0.007	Reject
	Salary	80	94	261	435				
	Farmer	20	31	73	124				
	Business	62	78	192	332				
	Other	30	45	117	192				
	Total	283	361	956	1600				

To test the association between customer engagement (multi-dimensional) and customer demographics the result of the chi-square test was analysed. The Chi-square test results on the collected data in Table no. 5.4(a) reveal that the customer's demographics gender (Chi-square =0.731 with p-value = 0.004), education (Chi-square =11.9 with a p-value of 0.006) and occupation (Chi-square =4.01 with p-value of 0.007), are significantly associated with human-based customer engagement. The age bracket of the customer (Chi-square =10.3 with p-value =0.357), is not significantly associated with human-based customer engagement.

Table no.5.4 (b) Association between Customer Demographics and Customer Engagement (Multi-Dimensional) Machine-Based Customer Engagement

Association between customer demographics and degree of machine-based customer engagement									
Parameter	Classification	Degree of machine-based customer engagement			Total	Chi-square	DF	P-Value	Hypotheses decision
		Low	Moderate	High					
Gender	Male	157	204	445	806	0.934	2	0.007	Reject

	Female	155	217	422	794				
	Total	312	421	867	1600				
Age Bracket	18-25	147	204	369	720	5.31	4	0.002	Reject
	26-59	124	157	374	655				
	60+	41	60	124	225				
	Total	312	421	867	1600				
Education	No formal education	17	21	31	69	4.58	6	0.009	Reject
	Up to schooling (10 th)	135	201	407	743				
	Graduate	132	167	365	664				
	Postgraduate	28	32	64	124				
	Total	312	421	867	1600				
Occupation	Housewife	105	125	287	517	14.2	10	0.001	Reject
	Salary	89	126	220	435				
	Farmer	26	20	78	124				
	Business	62	97	173	332				
	Other	30	53	109	192				
	Total	312	421	867	1600				

The Chi-square test results on the collected data in Table no. 5.4(b) reveal that the customer's demographics gender (Chi-square =0.934 with p-value = 0.007), age bracket (Chi-square =5.31 with p-value =0.002), education (Chi-square =4.58 with p-value = 0.009) and occupation (Chi-square =14.2 with p-value =0.001) are significantly associated with machine-based customer engagement.

5.3 ASSOCIATION BETWEEN CUSTOMER SATISFACTION (UNI-DIMENSIONAL) AND CUSTOMER DEMOGRAPHICS

The Chi-square test has been used to test the following hypotheses on customer satisfaction (uni- dimensional) and demographic details

H13: The gender of the customer is not significantly associated with the degree of customer satisfaction (uni-dimensional).

H14: Age of the customer is not significantly associated with the degree of customer satisfaction (uni-dimensional).

H15: Customer education is not significantly associated with the degree of customer satisfaction (uni-dimensional).

H16: Customer occupation is not significantly associated with the degree of customer satisfaction (uni-dimensional).

To conduct the Chi-square test for the association of customer satisfaction (uni-dimensional) and customer demographics, the degree of satisfaction is calculated on the summated score of the constructs. The customer response to construct customer satisfaction is summed to get the summated score for the construct (thirty attributes). The scores are categorised as low, moderate and high based on the summated score scale. The categorisation of the summated score is as shown in Table no. 5.5.

Table no.5.5 Categorization of Summated Score Customer Satisfaction (Uni-dimensional)

Construct	Degree	Score	Max and Min range
Customer Satisfaction	Low	Up to 104	Min =30, Max= 210
	Moderate	105 – 156	
	High	Greater than 156	

Table no. 5.6 Association between Customer Demographics and Degree of Customer Satisfaction (Uni-dimensional)

Association between customer gender and degree of customer satisfaction									
Parameter	Classification	Degree of customer satisfaction			Total	Chi-square	DF	P-Value	Hypotheses decision
		Low	Moderate	High					
Gender	Male	67	277	462	806	0.313	2	0.005	Reject
	Female	63	283	448	794				
	Total	130	560	910	1600				
Association between customer age bracket and degree of customer satisfaction									
Parameter	Classification	Degree of customer satisfaction			Total	Chi-square	DF	P-Value	Hypotheses decision
		Low	Moderate	High					
Age Bracket	18-25	55	266	399	720	4.12	4	0.003	Reject
	26-59	55	220	380	655				
	60+	20	74	131	225				
	Total	130	560	910	1600				
Association between education and degree of customer satisfaction									
Parameter	Classification	Degree of customer satisfaction			Total	Chi-square	DF	P-Value	Hypotheses decision
		Low	Moderate	High					
Education	No formal education	6	29	34	69	2.93	6	0.008	Reject
	Up to schooling (10 th)	61	250	432	743				
	Graduate	55	236	373	664				
	Postgraduate	8	45	71	124				
	Total	130	560	910	1600				

Association between occupation and degree of customer satisfaction									
Parameter	Classification	Degree of customer satisfaction			Total	Chi-square	DF	P-Value	Hypotheses decision
		Low	Moderate	High					
Occupation	Housewife	49	168	300	517	8.15	10	0.014	Reject
	Salary	34	156	245	435				
	Farmer	7	41	76	124				
	Business	24	128	180	332				
	Other	16	67	109	192				
	Total	130	560	910	1600				

The Chi-square test (Table no. 5.6) reveals that the customer's demographics gender (Chi-square =0.313 with p-value = 0.005), age bracket (Chi-square =4.12 with p-value =0.003), education (Chi-square =0.293 with a p-value of 0.008) and occupation (Chi-square =8.15 with p-value of 0.014), are significantly associated with customer satisfaction (unidimensional).

5.4 ASSOCIATION BETWEEN CUSTOMER SATISFACTION (MULTI-DIMENSIONAL) AND CUSTOMER DEMOGRAPHICS

The factors which were derived after EFA and CFA of customer satisfaction named network, value, care, experience and delight are taken to test the association with the customer demographics.

The Chi-square test has been used to test the following hypotheses on customer satisfaction (multi-dimension) and demographic details

H17: The gender of the customer is not significantly associated with the degree of the network.

H18: The age of the customer is not significantly associated with the degree of network.

H19: Customer education is not significantly associated with the degree of network.

H20: Customer occupation is not significantly associated with the degree of network.

H21: The gender of the customer is not significantly associated with the degree value.

H22: The age of the customer is not significantly associated with the degree value.

H23: Customer education is not significantly associated with the degree of value.

H24: Customer occupation is not significantly associated with the degree of value.

H25: The gender of the customer is not significantly associated with the degree of care.

H26: The age of the customer is not significantly associated with the degree of care.

H27: Customer education is not significantly associated with the degree of care.

H28: Customer occupation is not significantly associated with the degree of care.

H29: The gender of the customer is not significantly associated with the degree of experience.

H30: The age of the customer is not significantly associated with the degree of experience.

H31: Customer education is not significantly associated with the degree of experience.

H32: Customer occupation is not significantly associated with the degree of experience.

H33: The gender of the customer is not significantly associated with the degree of delight.

H34: The age of the customer is not significantly associated with the degree of delight.

H35: Customer education is not significantly associated with the degree of delight.

H36: Customer occupation is not significantly associated with the degree of delight.

To conduct the Chi-square test for the association of customer satisfaction (multi-dimensional) and customer demographics, the degree of satisfaction is calculated on the summated score of the constructs. The customer response of construct customer satisfaction for each factor i.e. network (ten attributes), value (nine attributes), care (four attributes), experience (four attributes) and delight (three attributes), is summed to get the summated score for the construct. The scores are categorised as low, moderate and high based on the summated score scale. The categorisation of the summated score is as shown in Table no. 5.7.

Table no. 5.7 Categorization of a Summated Score of Customer Satisfaction (Multi-dimensional)

Factor	Degree of Customer Satisfaction	Score	Max and Min range
Network	Low	Up to 35	Min =10 & Max= 70
	Moderate	36-53	
	High	Greater than 53	
Value	Low	Up to 32	Min =9 &Max= 63
	Moderate	33-48	
	High	Greater than 48	
Care	Low	Up to 14	Min=4 & Max=28
	Moderate	15-21	
	High	Greater than 21	
Experience	Low	Up to 14	Min=4 & Max=28
	Moderate	15-21	
	High	Greater than 21	
Delight	Low	Up to 11	Min=3 & Max=21
	Moderate	12--16	
	High	Greater than 16	

Table no.5.8(a) Association between Customer Demographics and Customer Satisfaction (Multi-Dimensional), network

Association between customer demographics and network									
Parameter	Classification	Degree of customer satisfaction, network			Total	Chi-square	DF	P-Value	Hypotheses decision
		Low	Moderate	High					
Gender	Male	123	197	486	806	4.83	2	0.019	Reject
	Female	95	220	479	794				
	Total	218	417	965	1600				
Age Bracket	18-25	92	199	429	720	2.31	4	0.006	Reject
	26-59	96	162	397	655				
	60+	30	56	139	225				
	Total	218	417	965	1600				
Education	No formal education	11	26	32	69	45.9	6	0.100	Fail to Reject
	Up to schooling (10 th)	97	179	467	743				
	Graduate	75	169	420	664				
	Postgraduate	35	43	46	124				
	Total	218	417	965	1600				
Occupation	Housewife	57	126	334	517	60.2	10	0.123	Fail to Reject
	Salary	53	111	271	435				
	Farmer	35	43	46	124				
	Business	60	93	179	332				
	Other	13	44	135	192				
	Total	218	417	965	1600				

The results of Chi-square Test Table no. 5.8(a) reveal that customer's demographics gender (Chi-square =4.83 with p-value = 0.019) and age bracket (Chi-square =2.31 with p-value =0.006) are significantly associated with network. The demographics like education (Chi-square =45.9 with p-value =0.100) and occupation (Chi-square =60.2 with p-value = 0.123), are not significantly associated with network.

Table no.5.8 (b) Association between Customer Demographics and Customer Satisfaction (Multi-Dimensional), value

Association between customer demographics and value									
Parameter	Classification	Degree of customer satisfaction, value			Total	Chi-square	DF	P-Value	Hypotheses decision
		Low	Moderate	High					
Gender	Male	107	238	461	806	0.407	2	0.008	Reject
	Female	112	225	457	794				
	Total	219	463	918	1600				

Age Bracket	18-25	403	222	403	1028	7.6	4	0.001	Reject
	26-59	381	172	381	934				
	60+	134	69	134	337				
	Total	918	463	918	2299				
Education	No formal education	21	20	28	69	47	6	0.101	Fail to Reject
	Up to schooling (10 th)	99	194	450	743				
	Graduate	76	193	395	664				
	Postgraduate	23	56	45	124				
	Total	219	463	918	1600				
Occupation	Housewife	71	144	302	517	25.3	10	0.512	Fail to Reject
	Salary	49	133	253	435				
	Farmer	28	46	50	124				
	Business	44	98	190	332				
	Other	27	42	123	192				
	Total	219	463	918	1600				

The results of Chi-square Test Table no. 5.8(b) reveal that the Customer's demographics gender (Chi-square =0.407 with p-value = 0.008) and age bracket (Chi-square =7.6 with p-value =0.001) are significantly associated with value. Education (Chi-square =47 with p-value =0.101) and occupation (Chi-square =25.3 with p-value = 0.512), are not significantly associated with value.

Table no.5.8(c) Association between Customer Demographics and Customer Satisfaction (Multi-Dimensional), care

Association between customer demographics and care									
Parameter	Classification	Degree of satisfaction , care			Total	Chi-square	DF	P-Value	Hypotheses decision
		Low	Moderate	High					
Gender	Male	151	208	447	806	0.502	2	0.027	Reject
	Female	138	207	449	794				
	Total	289	415	896	1600				
Age Bracket	18-25	130	194	396	720	4.73	4	0.031	Reject
	26-59	128	164	363	655				
	60+	31	57	137	225				
	Total	289	415	896	1600				
Education	No formal education	19	25	25	69	25.5	6	0.121	Fail to Reject
	Up to schooling (10 th)	121	182	440	743				
	Graduate	116	169	379	664				
	Postgraduate	33	39	52	124				
	Total	289	415	896	1600				
Occupation	Housewife	94	138	285	517	24.7	10	0.612	Fail to Reject
	Salary	84	99	252	435				

	Farmer	29	44	51	124				
	Business	52	93	187	332				
	Other	30	41	121	192				
	Total	289	415	896	1600				

The results of the Chi-square test (Table no. 5.8(c)) reveal that the Customer's demographics gender (Chi-square =0.502 with p-value = 0.027) and age bracket (Chi-square =4.73 with p-value =0.031), are significantly associated with care. Education (Chi-square =25.5 with p-value =0.121) and occupation (Chi-square =24.7 with p-value =0.612), are not significantly associated with care.

Table no.5.8 (d) Association between Customer Demographics and Customer Satisfaction (Multi-Dimensional), experience

Association between customer demographics and experience									
Parameter	Classification	Degree of customer satisfaction, experience			Total	Chi-square	DF	P-Value	Hypotheses decision
		Low	Moderate	High					
Gender	Male	178	214	414	806	0.962	2	0.018	Reject
	Female	176	227	391	794				
	Total	354	441	805	1600				
Age Bracket	18-25	165	190	365	720	3.43	4	0.048	Reject
	26-59	147	190	318	655				
	60+	42	61	122	225				
	Total	354	441	805	1600				
Education	No formal education	12	27	30	69	30.5	6	0.451	Fail to Reject
	Up to schooling (10 th)	180	181	382	743				
	Graduate	119	196	349	664				
	Postgraduate	43	37	44	124				
	Total	354	441	805	1600				
Occupation	Housewife	114	127	276	517	51.7	10	0.511	Fail to Reject
	Salary	74	145	216	435				
	Farmer	47	43	34	124				
	Business	74	88	170	332				
	Other	45	38	109	192				
	Total	354	441	805	1600				

The results of Chi-square Test Table no. 5.8(d) reveal that the Customer's demographics gender (Chi-square =0.962 with p-value = 0.018) and age bracket (Chi-square =3.43 with p-value =0.048), are significantly associated with experience. Education (Chi-square =30.5 with p-value= 0.451) and occupation (Chi-square =51.7 with p-value=0.511), are not significantly associated with experience.

Table no.5.8 (e) Association between Customer Demographics and Customer Satisfaction (Multi-Dimensional), delight

Association between customer demographics and delight									
Parameter	Classification	Degree of customer satisfaction, delight			Total	Chi-square	DF	P-Value	Hypotheses decision
		Low	Moderate	High					
Gender	Male	113	276	405	794	3.25	2	0.019	Reject
	Female	137	254	415	806				
	Total	250	530	820	1600				
Age Bracket	18-25	112	240	368	720	1.55	4	0.018	Reject
	26-59	107	219	329	655				
	60+	31	71	123	225				
	Total	250	530	820	1600				
Education	No formal education	23	23	23	69	41.7	6	0.701	Fail to Reject
	Up to schooling (10 th)	89	238	416	743				
	Graduate	107	221	336	664				
	Postgraduate	31	48	45	124				
	Total	250	530	820	1600				
Occupation	Housewife	70	175	272	517	39.2	10	0.178	Fail to Reject
	Salary	63	144	228	435				
	Farmer	41	40	43	124				
	Business	55	111	166	332				
	Other	21	60	111	192				
	Total	250	530	820	1600				

The results of Chi-square test (Table no. 5.8(e)) reveal that Customer’s demographics gender (Chi-square = 3.2 with p-value = 0.019) and age bracket (Chi-square =1.55 with p-value =0.018) are significantly associated with delight. Education (Chi-square =41.7 with p-value= 0.701) and occupation (Chi-square =39.2 with p-value=0.178), are not significantly associated with delight.

5.5 CONCLUSION:

The result of the study reveals a significant association of gender with customer engagement and satisfaction. It is interesting to note that gender plays a significant role across all models of customer engagement and satisfaction. The evidence produced by the data is sufficient to reject the null hypothesis of no significant association across all uni-dimensional and multi-dimensional models of customer engagement and satisfaction.

The uni-dimensional view of the association of customer engagement with the age of respondents does not provide sufficient evidence to reject the null hypothesis of no

significant association. However, a significant association of age with machine-based customer engagement has been supported by the data in the multi-dimensional view of customer engagement.

The uni-dimensional view of the association of customer satisfaction with the age of respondents provides sufficient evidence to reject the null hypothesis of no significant association. Similar inferences have been drawn in the models specifying the association of age with the multi-dimensional view of customer satisfaction.

The association of education with machine-based customer engagement, human-based engagement and satisfaction has important implications for the telecom industry. It is notable that in the context of the present study, the association of education with sub-dimensions of customer satisfaction construct such as network, value, care, experience and delight turn insignificant and provide an opportunity for future investigation.

The study shows that telecom companies must consider the occupation criteria of their customer while designing their customer engagement strategy for human-based and machine-based customer engagement service channels, on the other side companies need to focus on the occupation of the customer an important factor while making a strategy for the customer satisfaction. The association of occupation with machine-based customer engagement and satisfaction has important implications for the telecom industry. It is interesting to note that the results of the present study do not find a significant association of occupation with various sub-dimensions of customer satisfaction i.e. network, value, care, experience and delight and provides future opportunities for the study.

CHAPTER VI

CUSTOMER ENGAGEMENT AND SATISFACTION RELATIONSHIP

The purpose of this chapter is to study the customer engagement and satisfaction relationship. The chapter starts with describing the procedure followed by a study of customer engagement and customer satisfaction relationship with four different models.

6.1 CUSTOMER ENGAGEMENT AND SATISFACTION RELATIONSHIP

This section describes the procedure followed for the assessment of customer engagement and satisfaction relationship. To assess customer engagement and satisfaction relationship, a two-stage procedure has been adopted. Firstly, a measurement model has been assessed and then the structural model has been examined.

The measurement model is a model which examines: (i) how systematically measured variables represent the underlying theoretical constructs specified in the measurement model and (ii) how logically various latent constructs are related to each other (Joreskog, 1971; Joreskog&Sorbom,1993). In the measurement model, all the constructs are assumed as exogenous and non-causal bidirectional relationships (reflected through double-headed arrows) are to be studied among them. All the manifest variables are allowed to load only on their prescribed construct with no cross-loadings i.e., the measures of two different constructs are not allowed to correlate with each other. However, the different constructs could be correlated with each other.

The structural model is a model which examines the causal relationship among constructs under investigation (Joreskog & Sorbom, 1993; Ullman, 2001). It measures the degree of dependency of the endogenous variable on the exogenous variables and assesses the significance of various hypothesized causal relationships (i.e., structural parameter estimates or path estimates). Any structural parameter estimates or path coefficient with a critical value of more than 1.96 at a five per cent level of significance or more than 2.58 at a one per cent level of significance specifies the significance of a causal relationship i.e., the causal relationship between hypothesized constructs significantly differ from zero.

Though the causal relationships between exogenous and endogenous variables can be accessed through regression analysis, SEM is a superior technique compared to regression analysis. Regression analysis treats variables and constructs identically and does not take into account any of the measurement properties that go along with forming a multiple-item

construct. Whereas, in the case of SEM all the properties of the measurement model are duly taken into care while assessing the causal relationship between two or more constructs. To assess the degree of model fit CFA/ SEM, rather than focusing on one index, often depends on several fit indices e.g., Normed Chi-square, GFI, AGFI, RMR, RMSEA, CFI, NFI etc. on the other side, these index statistics are normally not obtainable in regression analysis. Careful consideration is that assessing a model fit through several fit indices is an added parsimony method than one with absolute or single model fit indices or criteria (Hair *et al.*,1998).

6.2 MODELS OF CUSTOMER ENGAGEMENT AND SATISFACTION RELATIONSHIP

To study the relationship between customer engagement and customer satisfaction four different models of customer engagement and satisfaction relationship have been conceptualized and examined for model fit and significance of structural parameter estimates.

Model 1: Customer Engagement (Uni- dimensional) → Satisfaction (Uni- dimensional)

Model 2: Customer Engagement (Multi- dimensional) → Satisfaction (Uni- dimensional)

Model 3: Customer Engagement (Uni- dimensional) → Satisfaction (Multi- dimensional)

Model 4: Customer Engagement (Multi- dimensional) → Satisfaction (Multi- dimensional)

To simplify the diagram below coding is done for the factor names which were derived from factor analysis under the engagement construct.

Machine-based customer engagement=Machine and Human-based customer engagement=Human.

The first model attempts to study the relationship between Uni- dimensional conceptualization of Customer Engagement and Satisfaction. The second model tests the null hypothesis of no significant impact of customer engagement on customer satisfaction by considering the multi-dimensional conceptualization of the Customer Engagement construct. Similarly, the third model tests the null hypotheses by adopting a multi-dimensional conceptualization of the Customer satisfaction construct. in the said relationship. The last model considers the multi-dimensional conceptualization of both i.e. Customer Engagement and Customer Satisfaction constructs.

6.2.1 Model 1: Customer Engagement (Uni- dimensional) → Satisfaction (Uni- dimensional)

The below section presents the measurement and structural model of Customer Engagement (Uni- dimensional) → Satisfaction (Uni- dimensional).

6.2.1.1 Measurement Model of Customer Engagement (Uni- dimensional) → Satisfaction (Uni- dimensional)

To assess the relationship between the Uni-dimensional construct of customer engagement and satisfaction, firstly measurement model (Figure no. 6.1) of these constructs has been examined for measurement adequacy and inter-construct correlation. The measurement model reveals a Normed Chi-square of 3.105 (2655.175/855); GFI = 0.867; AGFI = 0.853; NFI = 0.871; CFI = 0.909; RMR = 0.154; RMSEA = 0.051. The results show Normed Chi-square is between 3.0 to 5.0, which is an acceptable cut-off range of less than 5.0 (Hu & Bentler, 1999). CFI exceed the threshold of 0.90. RMSEA fall below the cut-off of 0.08. GFI, AGFI and NFI were very nearer to the conservative cut-off of 0.90 (Joreskog & Sorbom, 1993; Hair *et al.*, 2008; Hooper *et al.*, 2008) but much beyond the progressive cut-off of 0.80 (Brett & Drasgow, 2002; Kanste *et al.*, 2007; Horzum & Cakir, 2009; Herzog, 2011). Given the complexities of the present model, the AGFI of 0.853 was quite adequate for the study. Hence, we can conclude that model can be used for further analysis. Further low standardized residuals (Table no. 6.1) affirm the claim that the pattern of relationships stated in the specified model was similar to the pattern of relationships expressed by the data. Standardized factor loadings for all the scale items are above 0.5 (Table no. 6.2). An AVE score of 0.659 for customer engagement and 0.651 for satisfaction confirms the convergent validity of these constructs. The CR value of the customer engagement and satisfaction construct shows results of 0.794 and 0.903 which satisfies the minimum cut-off threshold of 0.60.

The inter-relatedness of customer engagement and satisfaction has been assessed through the significance of the covariance arrow. The measurement model reveals a critical ratio of 12.728 and a correlation coefficient of 0.959 between customer engagement and satisfaction these indices were significant ($p = 0.001$) indicating a high degree of positive correlation between these constructs.

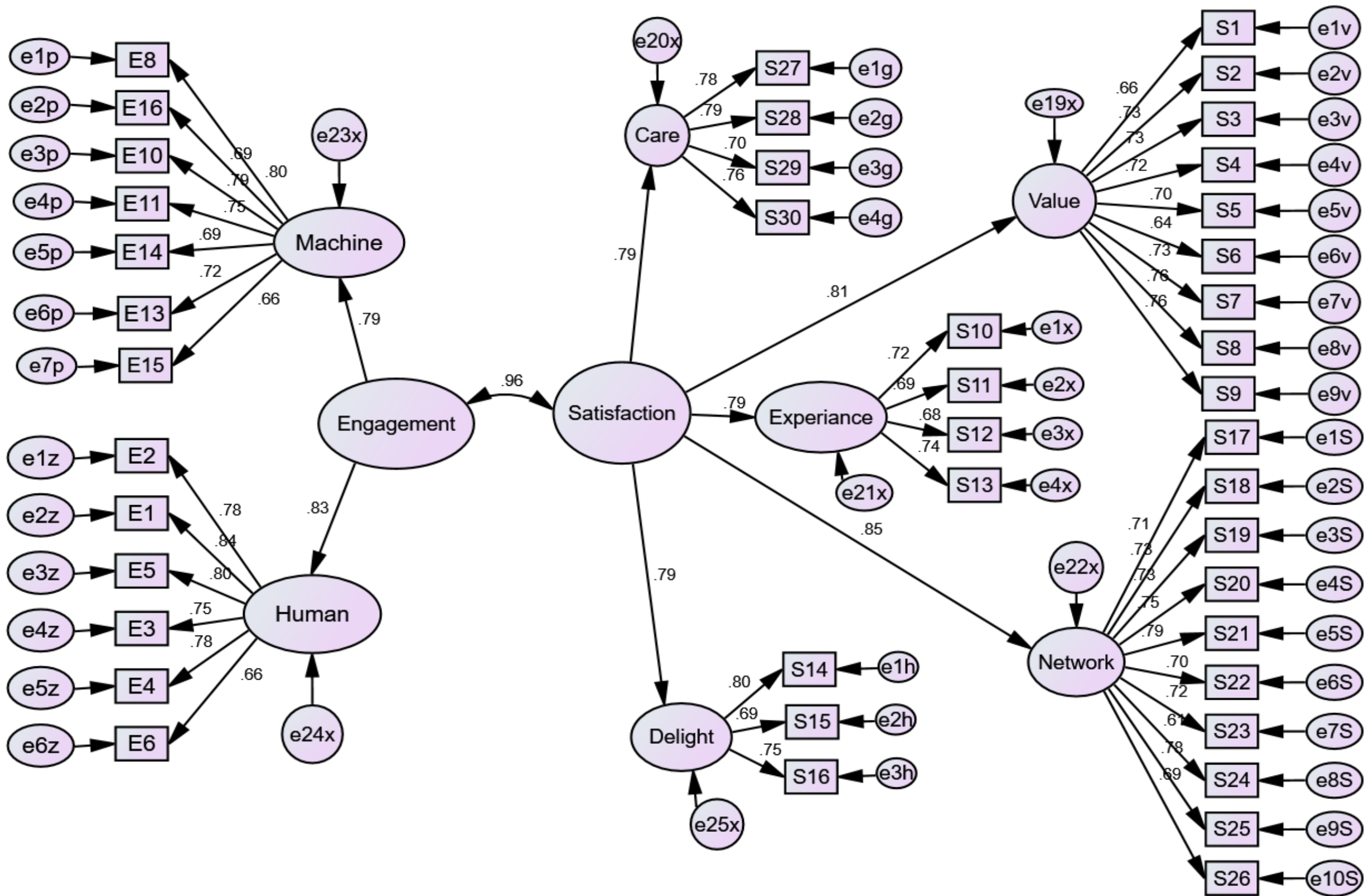


Figure no. 6.1 Measurement Model for Customer Engagement (Uni-dimensional) and Satisfaction (Uni- dimensional)

Table no. 6.1 Standardized Residuals of Measurement Model for Customer Engagement (Uni-dimensional) and Customer Satisfaction(Uni- dimensional)

	S30	S29	S28	S27	S26	S25	S24	S23	S22	S21	S20	S19	S18	S17	S9	S8	S7	S6	S5	S4	S3	S2	S1	S13	S12	S11	S10	S16	S15	S14	E6	E4	E3	E5	E1	E2	E15	E13	E14	E11	E10	E16	E8					
S30	0.0																																															
S29	1.3	0.0																																														
S28	-0.6	-0.5	0.0																																													
S27	0.3	-0.6	0.2	0.0																																												
S26	0.5	1.6	1.6	0.8	0.0																																											
S25	2.9	0.8	3.9	2.4	-1.1	0.0																																										
S24	1.6	4.9	1.5	1.5	-0.6	-0.7	0.0																																									
S23	-0.9	0.5	0.5	-1.2	0.1	0.2	-0.9	0.0																																								
S22	-1.4	-2.0	-0.3	-1.4	1.5	-0.2	-0.1	-0.5	0.0																																							
S21	-0.7	-0.7	-0.1	-0.8	-1.2	0.5	-0.2	0.5	-0.6	0.0																																						
S20	-1.1	-0.4	0.2	0.1	0.9	-0.6	-0.5	0.4	1.8	-0.7	0.0																																					
S19	0.7	-0.4	0.7	0.8	0.2	0.2	-1.0	0.6	-0.6	0.2	0.0	0.0																																				
S18	0.2	-0.6	0.3	0.3	-1.8	0.4	1.2	-1.3	0.0	1.2	-0.6	0.8	0.0																																			
S17	-1.3	0.1	0.3	-2.2	0.6	0.2	-0.7	0.5	0.3	-0.3	0.9	-0.4	0.3	0.0																																		
S9	-0.8	0.7	-0.1	-1.2	4.3	1.2	4.5	1.7	-0.1	2.4	1.8	1.0	0.9	1.9	0.0																																	
S8	-3.0	-2.5	-0.1	-1.5	2.6	-0.5	1.3	-0.3	0.0	0.5	-0.1	-1.4	-0.5	0.3	-0.7	0.0																																
S7	-1.3	-0.3	-1.2	-2.8	3.1	-0.4	2.1	-0.5	-1.0	0.6	0.0	-0.6	-1.4	-0.8	2.2	0.6	0.0																															
S6	-0.6	1.2	1.3	0.3	2.9	1.9	2.2	1.6	2.0	1.6	2.1	0.6	1.3	1.7	-1.6	-0.5	-0.5	0.0																														
S5	-2.5	-0.6	-0.7	-0.9	3.3	0.4	1.8	-1.2	1.3	-0.1	-0.7	-2.1	0.0	-0.4	-0.7	0.0	-0.7	-0.8	0.0																													
S4	-1.3	-0.5	0.5	-1.9	2.5	0.1	0.9	0.9	0.1	0.0	0.1	-2.2	-1.3	0.8	-0.5	0.8	-0.8	0.8	1.1	0.0																												
S3	-0.8	0.8	-0.8	0.2	3.3	-1.4	1.5	-2.0	-1.6	-1.2	-2.0	-1.9	-1.8	-2.2	0.4	-0.6	-0.3	-0.7	1.2	0.0	0.0																											
S2	-2.2	0.0	-0.5	-1.2	2.7	-0.2	2.5	0.9	0.5	0.3	0.4	-0.8	-1.7	-2.0	0.3	0.2	0.0	-0.5	0.4	-0.3	0.2	0.0																										
S1	-1.9	0.2	-1.4	-0.5	-0.6	-0.4	3.4	0.7	1.2	1.3	-2.0	-0.4	-0.1	-0.1	-1.0	1.2	-0.5	1.9	-0.6	-0.5	-0.3	0.3	0.0																									
S13	0.1	-0.5	0.2	0.0	1.1	0.3	4.3	0.5	-0.2	0.3	-0.5	1.2	2.2	-0.5	1.8	0.5	1.5	3.0	0.1	0.0	2.3	0.0	0.5	0.0																								
S12	-1.3	-1.8	-1.2	-1.7	-0.7	-1.2	-0.2	-0.8	-0.9	-0.2	-1.1	-1.3	0.6	-1.6	-0.6	-0.8	-0.8	1.2	-1.2	-1.3	-1.4	-1.9	-0.4	-1.1	-0.6																							
S11	-1.5	-2.3	-1.0	-2.4	-0.2	-2.7	1.1	-0.7	-2.0	-0.3	-1.9	-1.3	-0.4	-2.1	-0.2	0.4	-0.8	2.0	0.8	1.5	0.4	-0.3	1.8	-0.7	0.2	0.0																						
S10	-1.9	0.4	-0.7	-0.1	0.1	-0.4	3.3	0.4	-1.4	-0.2	0.0	0.8	0.0	-0.8	0.2	-0.9	-0.4	0.7	-1.5	-1.2	-0.2	-1.0	0.6	0.3	0.4	0.9	0.5																					
S16	-2.4	-2.0	1.2	-1.1	2.2	2.1	1.7	2.3	1.9	1.7	1.8	1.3	0.5	1.2	0.8	1.0	0.3	4.3	2.1	1.4	1.2	2.0	0.4	1.0	-0.1	0.2	-0.5	0.3																				
S15	-2.0	-1.0	1.2	0.8	2.6	-0.5	-0.1	0.0	1.4	1.3	0.7	0.0	-0.7	-0.6	-1.1	0.4	-0.7	4.3	1.1	0.6	1.4	0.9	-0.1	0.5	0.6	1.6	0.8	-0.9	0.0																			
S14	-2.1	-1.8	0.4	-0.6	0.4	-0.6	0.0	0.6	0.0	0.0	-1.0	-0.5	-1.5	-1.6	-0.1	0.5	-0.6	2.5	0.8	1.0	0.8	0.9	-0.9	-0.1	-1.1	-0.7	-1.1	0.4	0.2	-0.2																		
E6	1.0	2.4	3.1	2.4	1.7	1.1	4.9	1.8	0.2	1.5	1.0	0.0	1.7	1.3	3.0	1.7	0.6	2.3	2.3	0.6	1.7	1.3	1.3	3.3	1.2	1.8	3.2	0.4	2.7	0.2	-0.1																	
E4	0.0	0.7	1.1	0.7	1.2	-0.4	2.7	-0.5	-0.2	0.0	0.2	-0.9	-0.7	-0.5	1.3	0.8	-0.6	1.9	0.9	0.5	0.8	-0.8	1.1	1.0	-0.1	1.8	-0.6	0.1	0.4	-1.1	-0.3	-0.1																
E3	-0.5	0.0	-1.4	-0.7	-0.4	-1.0	3.1	-0.1	-1.0	0.2	0.1	-0.5	-0.4	-0.6	0.1	-0.9	0.0	1.4	-0.1	-0.6	-0.1	-1.9	0.4	1.6	-1.4	-0.3	0.2	-1.1	-1.1	-1.3	0.2	0.0	-0.1															
E5	0.1	0.0	0.4	0.4	-0.1	-0.6	1.9	-2.1	-1.6	-0.9	0.0	-0.5	-0.3	-1.2	-0.4	-1.2	-0.1	2.0	-0.7	-0.6	-0.7	-0.4	-0.3	0.7	-0.6	0.8	0.6	-1.6	0.5	-1.9	-0.9	0.3	-0.3	-0.1														
E1	1.0	0.8	0.6	0.7	-0.8	-0.9	2.9	-1.0	-2.5	-0.8	-1.2	-0.3	-0.1	-0.7	0.3	-0.4	0.0	1.1	-0.7	-1.0	0.7	-1.8	-0.3	1.7	-0.4	-0.7	-0.4	-0.4	-0.2	-2.0	-1.5	-0.5	0.4	0.1	-0.1													
E2	-0.1	-0.9	-0.1	-0.5	-2.1	-1.2	1.7	-0.8	-2.4	-1.4	-2.3	-1.1	-1.8	-1.8	-0.8	-0.6	-1.9	-0.1	-0.7	-2.0	-1.4	-2.3	-0.7	0.8	0.7	0.8	0.5	-1.2	0.0	-1.4	1.0	-0.7	-0.4	-0.2	0.1	-0.3												
E15	1.0	1.0	1.2	0.5	1.6	1.0	1.7	1.6	1.4	1.4	0.3	0.6	0.1	0.3	2.0	0.7	1.1	3.1	1.8	2.2	2.8	0.5	2.6	1.7	-0.6	1.3	1.7	2.0	2.0	2.3	0.3	-0.9	-1.5	-0.1	-0.5	-2.5	0.1											
E13	1.1	2.1	2.1	3.1	-0.3	-0.3	1.2	-0.4	-1.2	-0.5	-2.0	0.1	0.0	-1.5	0.5	-0.4	-2.0	1.9	0.5	-0.8	0.0	-2.6	2.2	2.2	0.5	1.5	1.0	-1.7	0.0	-0.7	1.4	1.7	-0.1	2.0	1.3	1.8	-0.1	0.1										
E14	1.9	1.1	1.9	2.1	0.3	-0.2	-1.3	-0.2	0.0	-0.2	-0.3	-0.4	0.4	-1.0	-0.4	-1.0	-2.1	0.7	-0.6	0.1	-0.9	-1.2	-1.8	1.7	1.2	1.1	0.6	1.0	1.1	0.1	1.3	3.2	0.1	1.2	2.2	-0.1	-2.0	0.3	0.1									
E11	1.6	0.9	2.5	1.7	1.0	1.2	1.3	-0.3	0.8	0.1	-0.9	0.2	-0.2	-0.1	0.2	0.4	-1.2	1.8	0.0	-0.3	0.4	-1.1	1.9	1.7	0.6	1.7	1.2	0.6	0.7	0.5	0.9	1.5	-1.4	0.3	0.4	0.6	1.2	0.2	0.4	0.1								
E10	3.0	3.2	2.0	1.8	1.2	-0.2	1.5	-0.6	-0.8	-0.3	-1.0	0.3	-0.3	-1.3	0.3	-0.8	-0.2	-0.1	-0.6	-1.7	0.4	-1.1	0.5	1.2	0.6	1.6	0.6	0.5	-0.4	-1.8	-1.4	1.4	-1.2	-0.4	0.5	-1.2	-0.9	-0.5	0.0	0.0	0.1							
E16	2.6	2.2	1.8	2.3	-0.9	-0.8	-2.1	-2.3	-3.0	-1.4	-3.1	-1.8	-0.6	-3.1	-1.3	-1.9	-2.1	-1.1	-1.4	-1.6	-0.4	-																										

Table no. 6.2 Psychometric Properties of the Measurement Model for Customer Engagement (Uni-dimensional) and Customer Satisfaction (Uni- dimensional)

Parameter	Index	Construct	Dimension	Std Factor Loading	AVE	CR
Chi-square	2655.175	Engagement	Human-based customer engagement	0.83	0.659	0.794
Degree of Freedom	855		Machine-based customer engagement	0.79		
Chi-square/ df	3.105	Satisfaction	Network	0.85	0.651	0.903
GFI	0.867		Value	0.81		
AGFI	0.853		Care	0.79		
NFI	0.871		Experience	0.79		
CFI	0.909		Delight	0.79		
RMR	0.154					
REMSA	0.051					

6.2.1.2 Structural Model of Customer Engagement (Uni- dimensional) → Satisfaction (Uni- dimensional)

The structural relationship between customer engagement and satisfaction (Figure no. 6.2) has been assessed through a structural model. Customer engagement has been considered an exogenous variable and satisfaction is defined as an endogenous variable. The causal relationship between these constructs has been disclosed through a single-headed arrow. The model fit indices have been assessed to examine the goodness of fit of the structural model. R square has been assessed to measure the degree of explained variance. Structural parameter estimate has been referred to measure the extent and significance of the contribution of the predictive variable towards the explained variance of the endogenous variable.

The structural model reveals the ratio of Chi-square to df ($2655.175/855$) = 3.105; GFI = 0.867; AGFI = 0.853; NFI = 0.871; CFI = 0.909; RMR = 0.154; and RMSEA = 0.051, Normed Chi-square between 3.0 to 5.0 which is acceptable cut off of 5.0(Hu & Bentler,1999). CFI exceed the threshold of 0.90. RMSEA fall below the cut-off of 0.08, GFI, AGFI and NFI were very nearer to the conservative cut-off of 0.90 (Joreskog & Sorbom, 1993; Hair *et al.*, 2008; Hooper *et al.*, 2008) but much beyond the progressive cut off of 0.80 (Brett & Drasgow, 2002; Kanste *et al.*,2007; Horzum & Cakir,2009; Herzog,2011). Given the complexities of the present model, the GFI, AGFI and NFI were quite adequate for the study. Hence, we can conclude that model can be used for further analysis.

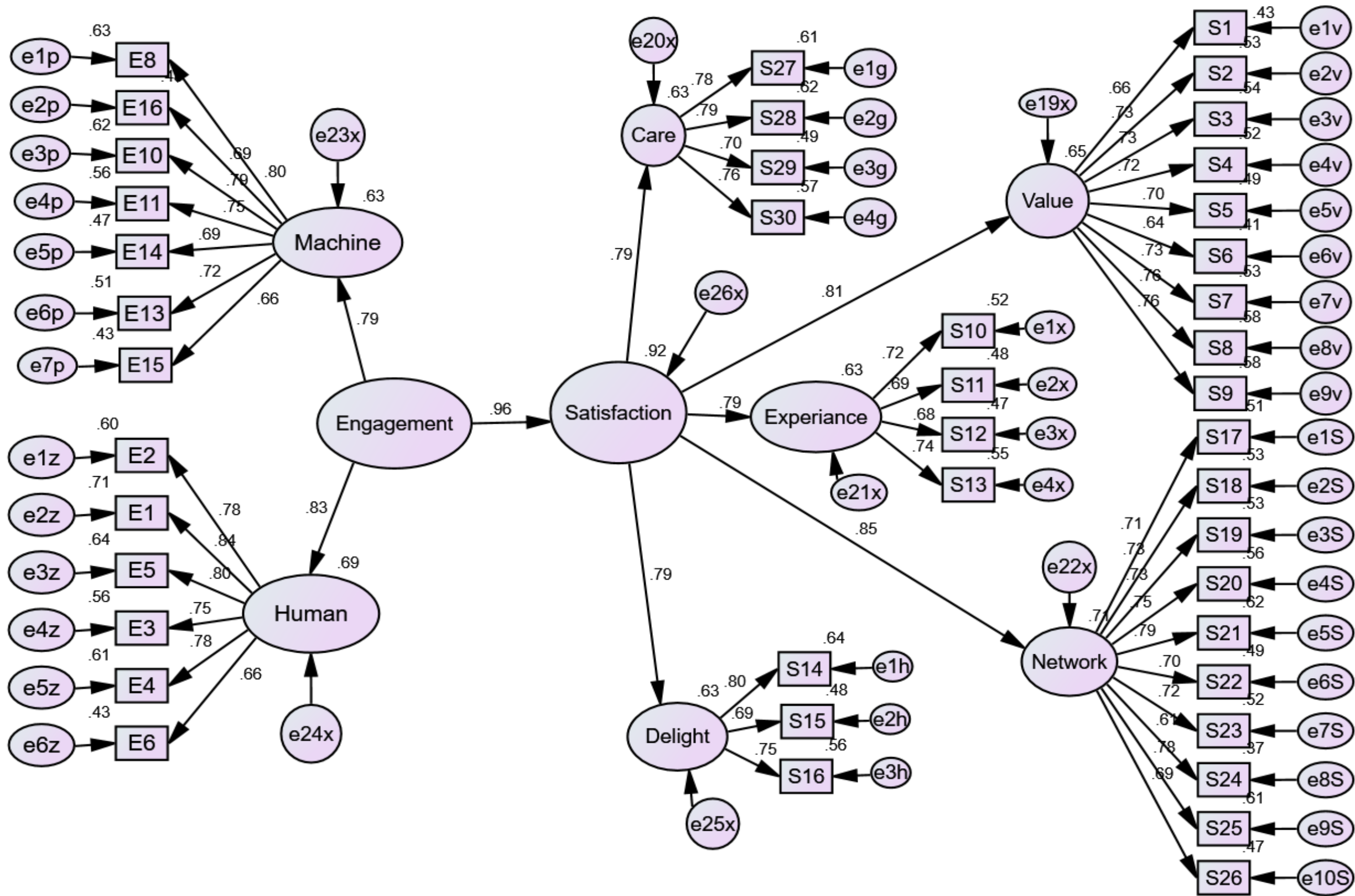


Figure no. 6.2 Structural Model for Customer Engagement (Uni-dimensional) and Satisfaction (Uni-dimensional)

The assessment of the structural parameter estimates of the specified path (i.e., engagement and satisfaction) reveals a critical ratio of 15.312, which was much beyond the cut-off of 1.96. The significant beta coefficient of the specified path affirms the positive and significant effect of customer engagement and satisfaction. R square index of 0.92 affirms the significant role of engagement in predicting satisfaction.

Table no. 6.3 Model Fit Indices and Path coefficients of Customer Engagement (Uni - dimensional) and Satisfaction (Uni- dimensional)

Parameter	Measurement Model	Structural Model
Chi-square	2655.175	2655.175
Degree of Freedom	855	855
Normed Chi-square (Chi-square/ df)	3.102	3.105
GFI	0.867	0.867
AGFI	0.853	0.853
NFI	0.871	0.871
CFI	0.909	0.909
RMR	0.154	0.154
REMSA	0.051	0.051
Path analysis		
R Square	0.92	
Path details	Critical Ratio	Path Coefficient
Engagement → Satisfaction	15.312	0.96

Significance level $p=0.001$

6.2.2 Model 2: Customer Engagement (Multi-dimensional) and Satisfaction Model (Uni-dimensional)

The below section presents the measurement and structural model of Customer Engagement (Multi-dimensional) and Satisfaction Model (Uni-dimensional).

6.2.2.1 Measurement Model of Customer Engagement (Multi-dimensional) and Satisfaction Model (Uni-dimensional)

To assess the relationship between the multi-dimensional construct of customer engagement and satisfaction (Uni-dimensional), firstly measurement model (Figure no. 6.3) of these constructs has been examined for measurement adequacy and inter-construct correlation. The measurement model reveals a Normed Chi-square of 3.109 (2654.762/854); GFI = 0.867; AGFI = 0.853; NFI = 0.871; CFI = 0.909; RMR = 0.154; RMSEA = 0.051. The Normed Chi-square is between 3.0 to 5.0, which is an acceptable cut-off range of less than 5.0 (Hu & Bentler, 1999). CFI exceed the threshold of 0.90. RMSEA fall below the cut-off of 0.08. GFI, AGFI and NFI were very nearer to the conservative cut-off of 0.90 (Joreskog & Sorbom, 1993; Hair *et al.*, 2008; Hooper *et al.*, 2008) but much beyond the progressive cut-off of 0.80 (Brett & Drasgow, 2002; Kanste *et al.*, 2007; Horzum & Cakir, 2009; Herzog, 2011). Given the complexities of the present model, the AGFI of 0.853 was quite adequate for the study. Hence, we can conclude that model can be used for further analysis.

Further low standardized residuals (Table no. 6.5) confirm the claim that the pattern of relationships stated in the specified model was similar to the pattern of relationships expressed by the data. Standardized factor loadings for all the scale items are above 0.5 (Table no. 6.4), An AVE score for human-based customer engagement is 0.591. Machine-based customer engagement is 0.533 and satisfaction is 0.651 confirms the convergent validity of these constructs. The CR value of the construct is 0.896, 0.888 and 0.903 respectively which satisfies the minimum cut-off threshold of 0.60.

The inter-relatedness of customer engagement (human-based customer engagement and machine-based customer engagement) and satisfaction has been assessed through the significance of the covariance arrow. Human-based customer engagement \leftrightarrow Satisfaction, Critical ratio = 11.897; Machine-based customer engagement \leftrightarrow Satisfaction, Critical ratio = 11.876, Significance level $p=0.001$.

Table no. 6.4 Psychometric Properties of the Measurement Model for Customer Engagement (Multi-dimensional) and Satisfaction (Uni-dimensional)

Parameter	Index	Construct	Dimension	Std Factor Loading	AVE	CR
Chi-square	2654.762	Engagement	Human-based customer engagement	0.79	0.591	0.896
Degree of Freedom	854		Machine-based customer engagement	0.77		
Chi-square/ df	3.109	Satisfaction	Network	0.85	0.651	0.903
GFI	0.867		Value	0.81		
AGFI	0.853		Care	0.80		
NFI	0.871		Experience	0.79		
CFI	0.909		Delight	0.79		
RMR	0.154					
REMSA	0.051					

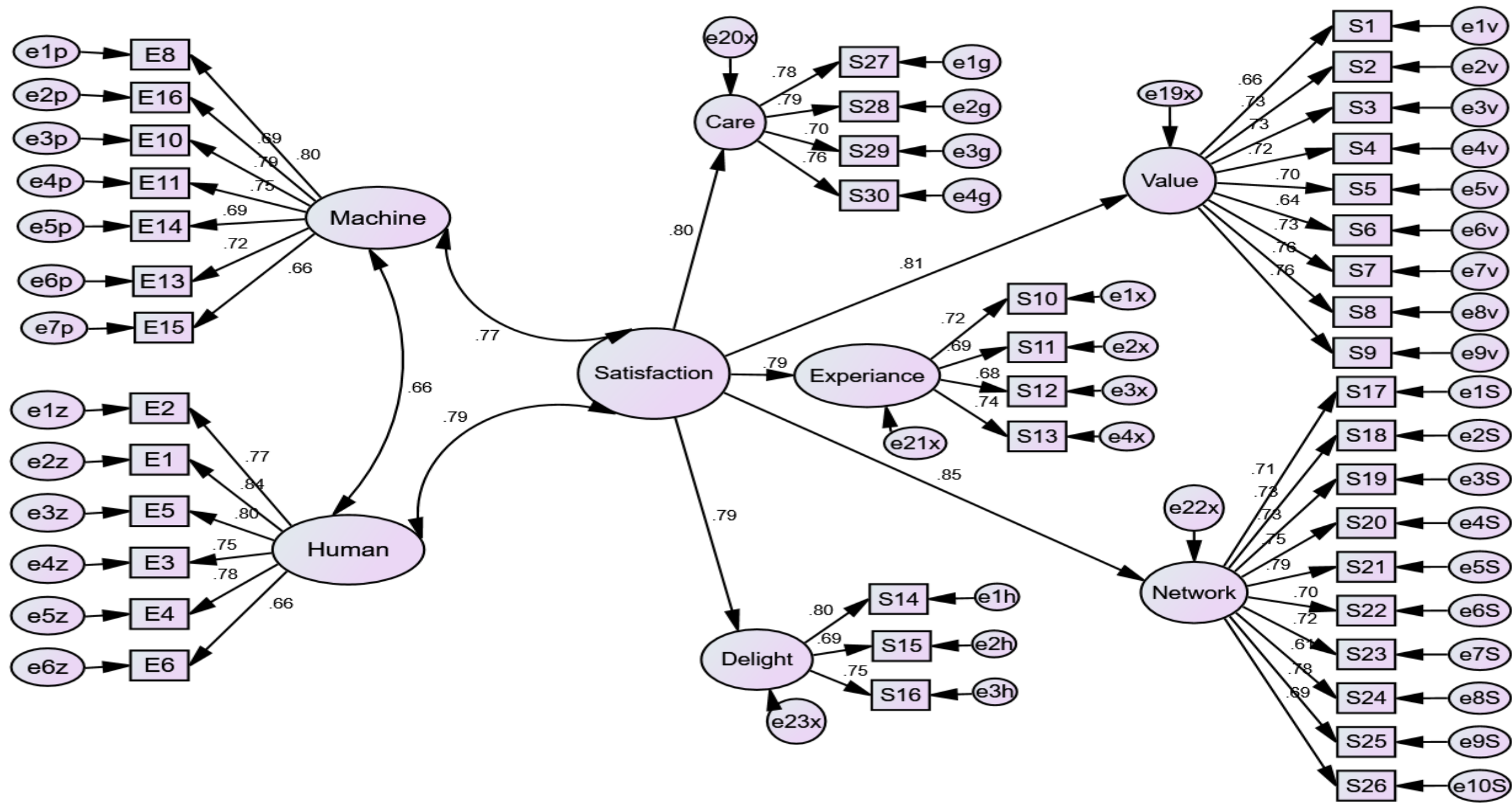


Figure no.6.3 Measurement Model for Engagement (Multi-dimensional) and Satisfaction (Uni-dimensional)

Table no. 6.5 Standardized Residuals of Measurement Model for Engagement (Multi-dimensional) and Satisfaction (Uni- dimensional)

	S30	S29	S28	S27	S26	S25	S24	S23	S22	S21	S20	S19	S18	S17	S9	S8	S7	S6	S5	S4	S3	S2	S1	S13	S12	S11	S10	S16	S15	S14	E6	E4	E3	E5	E1	E2	E15	E13	E14	E11	E10	E16							
S30	0.0																																																
S29	1.3	0.0																																															
S28	-0.6	-0.5	0.0																																														
S27	0.3	-0.6	0.2	0.0																																													
S26	0.5	1.6	1.6	0.8	0.0																																												
S25	2.9	0.8	3.9	2.4	-1.1	0.0																																											
S24	1.6	4.9	1.5	1.5	-0.6	-0.7	0.0																																										
S23	-0.9	0.5	0.5	-1.2	0.1	0.2	-0.9	0.0																																									
S22	-1.4	-2.0	-0.3	-1.4	1.5	-0.2	-0.1	-0.5	0.0																																								
S21	-0.7	-0.7	-0.1	-0.8	-1.2	0.5	<u>-0.2</u>	0.5	-0.6	0.0																																							
S20	-1.1	-0.4	0.2	0.1	0.9	-0.6	-0.5	0.4	1.9	-0.7	0.0																																						
S19	0.7	-0.4	0.6	0.8	0.2	0.2	-1.0	0.6	-0.6	0.2	0.0	0.0																																					
S18	0.2	-0.6	0.3	0.3	-1.8	0.4	1.2	-1.3	0.0	1.2	-0.6	0.8	0.0																																				
S17	-1.3	0.1	0.3	-2.2	0.6	0.2	-0.7	0.5	0.3	-0.3	0.9	-0.4	0.3	0.0																																			
S9	-0.8	0.7	-0.1	-1.2	4.3	1.2	4.5	1.7	-0.1	2.4	1.8	1.0	0.9	1.9	0.0																																		
S8	-3.0	-2.5	-0.1	-1.5	2.6	-0.5	1.3	-0.3	0.0	0.5	-0.1	-1.4	-0.5	0.3	-0.7	0.0																																	
S7	-1.3	-0.3	-1.2	-2.8	3.1	-0.4	2.1	-0.5	-1.0	0.6	0.0	-0.6	-1.4	-0.8	2.2	0.6	0.0																																
S6	-0.6	1.2	1.3	0.3	2.9	1.9	2.2	1.6	2.0	1.6	2.1	0.6	1.3	1.7	-1.6	-0.5	-0.5	0.0																															
S5	-2.5	-0.6	-0.7	-0.9	3.3	0.4	1.8	-1.2	1.3	-0.1	-0.7	-2.1	0.0	-0.4	-0.7	0.0	-0.7	-0.8	0.0																														
S4	-1.3	-0.5	0.4	-1.9	2.5	0.1	0.9	0.9	0.1	0.0	0.1	-2.2	-1.3	0.8	-0.5	0.8	-0.8	0.8	1.1	0.0																													
S3	-0.8	0.8	-0.8	0.2	3.3	-1.4	1.5	-2.0	-1.6	-1.2	-2.0	-1.9	-1.8	-2.2	0.4	-0.6	-0.3	-0.7	1.2	0.0	0.0																												
S2	-2.2	0.0	-0.5	-1.2	2.7	-0.1	2.5	0.9	0.5	0.3	0.4	-0.8	-1.7	-2.0	0.3	0.2	0.0	-0.5	0.4	-0.3	0.2	0.0																											
S1	-1.9	0.2	-1.4	-0.5	-0.6	-0.4	3.4	0.7	1.2	1.3	-2.0	-0.4	-0.1	-0.1	-1.0	1.2	-0.5	1.9	-0.6	-0.5	-0.3	0.3	0.0																										
S13	0.1	-0.5	0.1	0.0	1.1	0.3	4.3	0.5	-0.2	0.3	-0.5	1.2	2.2	-0.5	1.8	0.5	1.5	3.0	0.1	0.0	2.3	0.0	0.5	0.0																									
S12	-1.3	-1.8	-1.2	-1.7	-0.7	-1.2	-0.2	-0.8	-0.9	-0.2	-1.1	-1.3	0.6	-1.6	-0.5	-0.8	-0.8	1.2	-1.2	-1.3	-1.4	-1.9	-0.4	-1.1	-0.6																								
S11	-1.5	-2.3	-1.0	-2.4	-0.2	-2.7	1.1	-0.7	-2.0	-0.3	-1.9	-1.3	-0.4	-2.1	-0.2	0.4	-0.7	2.0	0.8	1.5	0.4	-0.3	1.8	-0.7	0.2	0.0																							
S10	-1.9	0.4	-0.7	-0.1	0.1	-0.4	3.3	0.4	-1.4	-0.2	0.0	0.8	0.0	-0.8	0.2	-0.9	-0.4	0.7	-1.5	-1.2	-0.2	-1.0	0.6	0.3	0.4	0.9	0.5																						
S16	-2.4	-2.0	1.2	-1.1	2.2	2.1	1.7	2.3	1.9	1.7	1.8	1.3	0.5	1.2	0.8	1.0	0.3	4.3	2.1	1.4	1.2	2.0	0.4	1.0	-0.1	0.2	-0.5	0.3																					
S15	-2.0	-1.0	1.2	0.8	2.6	-0.5	-0.1	0.0	1.4	1.3	0.7	0.1	-0.7	-0.6	-1.1	0.4	-0.7	4.3	1.1	0.7	1.4	0.9	-0.1	0.5	0.6	1.6	0.8	-0.9	0.0																				
S14	-2.1	-1.8	0.3	-0.6	0.4	-0.6	0.0	0.6	0.0	0.0	-1.0	-0.5	-1.4	-1.6	-0.1	0.5	-0.6	2.5	0.8	1.0	0.8	0.9	-0.9	-0.1	-1.1	-0.7	-1.1	0.4	0.2	-0.2																			
E6	1.1	2.5	3.2	2.5	1.7	1.2	5.0	1.8	0.3	1.6	1.1	0.1	1.8	1.3	3.1	1.7	0.7	2.4	2.4	0.6	1.7	1.4	1.4	3.4	1.3	1.9	3.3	0.5	2.8	0.3	0.0																		
E4	0.1	0.8	1.1	0.8	1.3	-0.3	2.7	-0.4	-0.1	0.1	0.3	-0.8	-0.6	-0.4	1.4	0.9	-0.5	1.9	1.0	0.6	0.9	-0.7	1.2	1.1	0.0	1.9	-0.5	0.1	0.4	-1.0	-0.2	0.0																	
E3	-0.4	0.1	-1.3	-0.6	-0.3	-0.9	3.2	0.0	-0.9	0.3	0.2	-0.4	-0.3	-0.5	0.2	-0.8	0.1	1.5	0.0	-0.5	0.0	-1.8	0.5	1.7	-1.4	-0.2	0.3	-1.1	-1.0	-1.2	0.3	0.1	0.0																
E5	0.1	0.1	0.5	0.5	-0.1	-0.5	1.9	-2.1	-1.5	-0.8	0.1	-0.4	-0.3	-1.2	-0.3	-1.1	0.0	2.1	-0.6	-0.5	-0.7	-0.4	-0.2	0.8	-0.6	0.9	0.7	-1.6	0.6	-1.8	-0.8	0.4	-0.2	0.0															
E1	1.1	0.9	0.7	0.8	-0.8	-0.8	3.0	-0.9	-2.4	-0.7	-1.2	-0.2	0.0	-0.6	0.4	-0.3	0.1	1.2	-0.6	-0.9	0.8	-1.7	-0.2	1.8	-0.4	-0.6	-0.3	-0.3	-0.1	-2.0	-1.4	-0.3	0.6	0.2	0.0														
E2	0.1	-0.8	0.1	-0.3	-1.9	-1.0	1.8	-0.6	-2.2	-1.2	-2.2	-0.9	-1.6	-1.6	-0.6	-0.4	-1.7	0.0	-0.5	-1.9	-1.2	-2.1	-0.5	1.0	0.9	0.9	0.7	-1.0	0.2	-1.2	1.2	-0.4	-0.2	0.1	0.4	0.0													
E15	0.9	0.9	1.1	0.4	1.5	0.9	1.7	1.5	1.3	1.3	0.2	0.5	0.1	0.2	1.9	0.6	1.0	3.0	1.7	2.1	2.7	0.4	2.5	1.6	-0.7	1.2	1.6	1.9	2.0	2.2	0.3	-1.0	-1.5	-0.1	-0.5	-2.4	0.0												
E13	1.0	2.0	2.0	3.0	-0.3	-0.4	1.1	-0.5	-1.3	-0.6	-2.0	0.0	-0.1	-1.6	0.4	-0.5	-2.1	1.8	0.4	-0.9	-0.1	-2.7	2.1	2.1	0.5	1.4	0.9	-1.8	-0.1	-0.8	1.4	1.7	-0.1	2.0	1.3	1.9	-0.2	0.0											
E14	1.8	1.0	1.8	2.0	0.2	-0.3	-1.3	-0.3	-0.1	-0.3	-0.4	-0.5	0.3	-1.1	-0.5	-1.1	-2.1	0.6	-0.7	0.0	-1.0	-1.3	-1.9	1.6	1.1	1.1	0.5	0.9	1.0	0.0	1.3	3.2	0.1	1.2	2.2	0.0	-2.1	0.2	0.0										
E11	1.5	0.8	2.4	1.6	0.9	1.0	1.2	-0.4	0.7	0.0	-1.0	0.1	-0.3	-0.2	0.1	0.3	-1.3	1.7	-0.1	-0.4	0.3	-1.2	1.8	1.6	0.5	1.6	1.1	0.5	0.6	0.4	0.9	1.4	-1.4	0.3	0.4	0.7	1.1	0.1	0.2	0.0									
E10	2.9	3.1	1.9	1.7	1.1	-0.3	1.4	-0.7	-0.9	-0.4	-1.1	0.2	-0.4	-1.4	0.2	-0.9	-0.4	-0.1	-0.7	-1.8	0.3	-1.2	0.4	1.1	0.5	1.5	0.5	0.4	-0.5	-1.9	-1.4	1.4	-1.2	-0.5	0.4	-1.1	-1.0	-0.6	-0.1	-0.1	0.0								
E16	2.5	2.1	1.7	2.2	-1.0	-0.9	-2.2	-2.4	-3.1	-1.5	-3.2	-1.9	-0.7	-3.2	-1.4	-2.0	-2.2	-1.2	-1.5	-1.7	-0.5	-2																											

6.2.2.2 Structural Model of Customer Engagement (Multi-dimensional) and Satisfaction Model (Uni- dimensional)

The structural relationship between customer engagement (multi-dimensional) and satisfaction(Uni- dimensional) has been assessed through a structural model (Figure no. 6.4). Human-based customer engagement and machine-based customer engagement are considered exogenous variables and satisfaction is defined as an endogenous variable. The causal relationship between these constructs has been disclosed through a single-headed arrow. The model fit indices have been assessed to examine the goodness of fit of the structural model. R square has been assessed to measure the degree of explained variance. Structural parameter estimate has been referred to measure the extent and significance of the contribution of the predictive variable towards the explained variance of the endogenous variable.

The structural model reveals the ratio of Chi-square to df $(2654.762/854) = 3.109$; GFI = 0.867; AGFI = 0.853; NFI = 0.871; CFI = 0.909; RMR = 0.154; and RMSEA = 0.051, Normed Chi-square between 3.0 to 5.0 which is acceptable cut off of 5.0(Hu & Bentler,1999). CFI exceed the threshold of 0.90. RMSEA fall below the cut-off of 0.08. GFI, AGFI and NFI were very nearer to the conservative cut-off of 0.90 (Joreskog & Sorbom, 1993; Hair *et al.*, 2008; Hooper *et al.*, 2008) but much beyond the progressive cut-off of 0.80 (Brett & Drasgow, 2002; Kanste *et al.*,2007; Horzum & Cakir, 2009; Herzog, 2011). Given the complexities of the present model, the values of GFI, AGFI and NFI were quite adequate for the study. Hence, we can conclude that model can be used for further analysis.

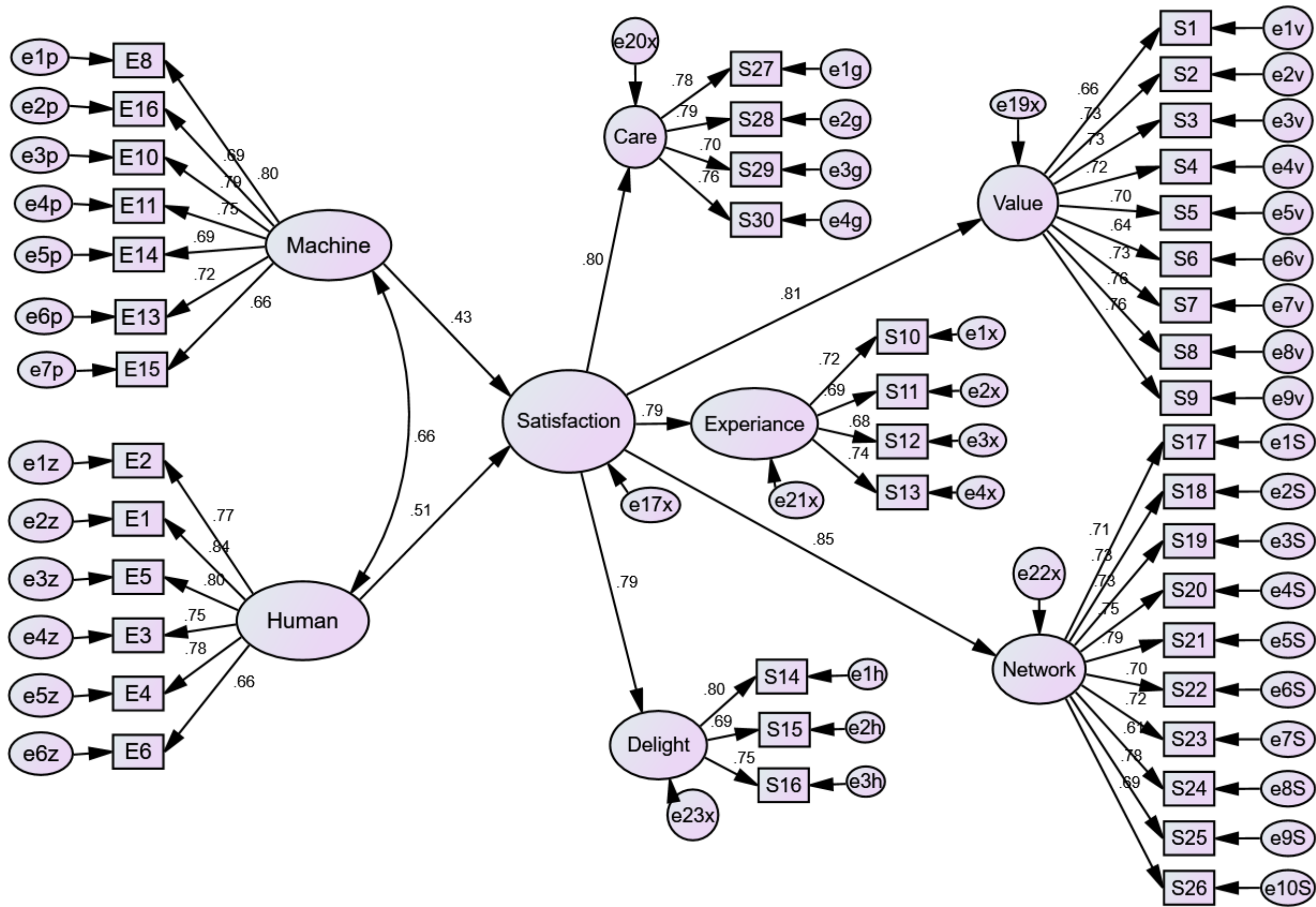


Figure no 6.4 Structure Model for Engagement (Multi-dimensional) and Satisfaction (Uni- dimensional)

The assessment of the structural parameter estimate of the specified path is shown below in Table no. 6.6 shows a critical ratio that was much beyond the cut-off of 1.96. The significant beta coefficient of the specified path confirms the positive and significant affect of customer engagement and satisfaction. R square index of 0.73 affirms the significant role of engagement (Multi-dimensional)in predicting satisfaction (Uni-dimensional).

Table no. 6.6 Model Fit Indices and Path coefficients of Customer Engagement (Multi-dimensional) and Satisfaction(Uni- dimensional)

Parameter	Measurement Model	Structural Model
Chi-square	2654.762	2654.762
Degree of Freedom	854	854
Normed Chi-square (Chi-square/ df)	3.109	3.109
GFI	0.867	0.867
AGFI	0.853	0.853
NFI	0.871	0.871
CFI	0.909	0.909
RMR	0.154	0.154
REMSA	0.051	0.051
Path analysis		
R Square	0.73	
Path details	Critical Ratio	Path Coefficient
Human-based Customer Engagement → Satisfaction	10.857	0.51
Machine-based Customer Engagement → Satisfaction	9.823	0.43

Significance level p=0.001

6.2.3 Model 3: Customer Engagement (Uni- dimensional) → Satisfaction (Multi-dimensional)

The below section presents the measurement and structural model of Customer Engagement (Uni- dimensional) → Satisfaction (Multi- dimensional).

6.2.3.1 Measurement Model of Customer Engagement (Uni- dimensional) → Satisfaction (Multi-dimensional)

To assess the relationship between the Uni-dimensional construct of customer engagement and satisfaction, firstly measurement model (Figure no. 6.5) of these constructs has been examined for measurement adequacy and inter-construct correlation. The measurement model reveals a Normed Chi-square of 3.025(2559.398/846); GFI =0.872; AGFI =0.857; NFI =0.876; CFI =0.913; RMR =0.144; RMSEA =0.050.

The results show Normed Chi-square is between 3.0 to 5.0, which is an acceptable cut-off range of less than 5.0(Hu & Bentler,1999). CFI exceed the threshold of 0.90. RMSEA fall below the cut-off of 0.08. GFI, AGFI and NFI were very nearer to the conservative cut-off of 0.90 (Joreskog & Sorbom, 1993; Hair *et al.*, 2008; Hooper *et al.*, 2008) but much beyond the progressive cut-off of 0.80 (Brett & Drasgow, 2002; Kanste *et al.*, 2007; Horzum & Cakir, 2009; Herzog, 2011). Given the complexities of the present model, the AGFI of 0.857 was quite adequate for the study. Hence, we can conclude that model can be used for further analysis. Further low standardized residuals (Table no.6.7) affirm the claim that the pattern of relationships stated in the specified model was similar to the pattern of relationships expressed by the data. Standardized factor loadings for all the scale items are above 0.5 (Table no. 6.8). An AVE score for customer engagement and satisfaction confirms the convergent validity of these constructs.

The Critical ratio value of customer engagement and satisfaction (multi-dimensional) construct shows the results of

Engagement <--> Value = 12.347, Engagement <--> Delight =13.049,
Engagement <--> Network=12.994, Engagement <--> Experience =13.794,
Engagement <--> Care =14.026

The inter-relatedness of customer engagement and satisfaction (multi-dimensional) has been assessed through the significance of the covariance arrow. The measurement model reveals a critical ratio of and a correlation coefficient between customer engagement and satisfaction

(Multi-dimensional) these indices were significant ($p = 0.001$) indicating a high degree of positive correlation between these constructs.

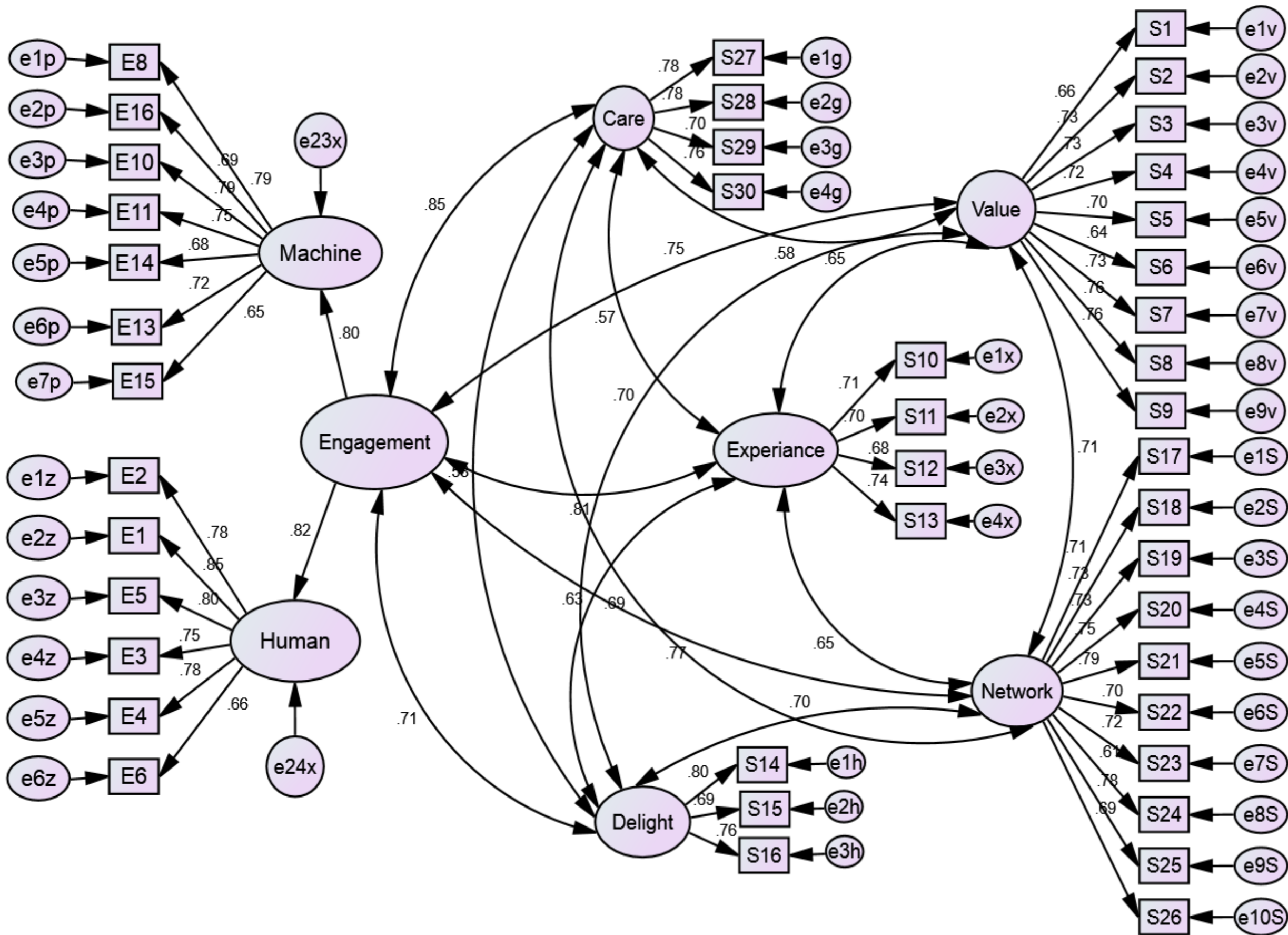


Figure no 6.5 Measurement Model for Customer Engagement (Un- dimensional) and Satisfaction (Multi-dimensional)

Table no. 6.7: Standardized Residual Covariances of Engagement (Uni-dimensional) and Satisfaction (Multi-dimensional)

	S30	S29	S28	S27	S26	S25	S24	S23	S22	S21	S20	S19	S18	S17	S9	S8	S7	S6	S5	S4	S3	S2	S1	S13	S12	S11	S10	S16	S15	S14	E6	E4	E3	E5	E1	E2	E15	E13	E14	E11	E10	E16	E8											
S30	0.0																																																					
S29	1.2	0.0																																																				
S28	-0.6	-0.4	0.0																																																			
S27	0.2	-0.6	0.3	0.0																																																		
S26	0.1	1.3	1.3	0.4	0.0																																																	
S25	2.4	0.5	3.6	2.0	-1.1	0.0																																																
S24	1.3	4.6	1.3	1.3	-0.6	-0.7	0.0																																															
S23	-1.3	0.2	0.2	-1.5	0.0	0.2	-0.9	0.0																																														
S22	-1.7	-2.3	-0.6	-1.7	1.4	-0.2	-0.1	-0.5	0.0																																													
S21	-1.1	-1.0	-0.4	-1.1	-1.2	0.5	-0.1	0.5	-0.6	0.0																																												
S20	-1.5	-0.7	-0.1	-0.3	0.8	-0.6	-0.5	0.4	1.8	-0.7	0.0																																											
S19	0.4	-0.6	0.4	0.5	0.2	0.1	-1.0	0.6	-0.6	0.2	0.0	0.0																																										
S18	-0.1	-0.9	0.1	0.0	-1.8	0.4	1.2	-1.2	0.0	1.3	-0.6	0.8	0.0																																									
S17	-1.6	-0.2	0.0	-2.5	0.6	0.2	-0.7	0.6	0.3	-0.3	0.3	-0.4	0.4	0.0																																								
S9	0.0	1.5	0.9	-0.2	3.9	0.8	4.2	1.3	-0.5	2.0	1.5	0.7	0.6	1.6	0.0																																							
S8	-2.2	-1.7	0.9	-0.6	2.2	-0.9	1.0	-0.7	-0.3	0.1	-0.4	-1.7	-0.8	-0.1	-0.7	0.0																																						
S7	-0.5	0.5	-0.3	-1.9	2.8	-0.8	1.8	-0.8	-1.3	0.2	-0.4	-0.9	-1.7	-1.1	2.3	0.6	0.0																																					
S6	0.1	1.9	2.2	1.0	2.6	1.5	1.9	1.2	1.7	1.2	1.8	0.2	1.0	1.4	-1.6	-0.6	-0.5	0.0																																				
S5	-1.8	0.2	0.2	-0.1	3.0	0.0	1.5	-1.5	1.0	-0.5	-1.1	-2.4	-0.3	-0.7	-0.7	0.0	-0.7	-0.9	0.0																																			
S4	-0.5	0.3	1.4	-1.0	2.1	-0.2	0.6	0.6	-0.3	-0.3	-0.3	-2.5	-1.6	0.5	-0.5	0.8	-0.8	0.7	1.1	0.0																																		
S3	0.1	1.6	0.1	1.2	3.0	-1.8	1.2	-2.3	-1.9	-1.5	-2.3	-2.2	-2.1	-2.5	0.5	-0.6	-0.2	-0.7	1.2	0.0	0.0																																	
S2	-1.4	0.8	0.4	-0.4	2.3	-0.5	2.2	0.5	0.2	-0.1	0.0	-1.1	-2.0	-2.4	0.3	0.2	0.0	-0.5	0.3	-0.3	0.3	0.0																																
S1	-1.1	1.0	-0.5	0.3	-0.9	-0.7	3.2	0.5	0.9	1.0	-2.3	-0.6	-0.4	-0.4	-1.0	1.2	-0.5	1.8	-0.5	-0.5	-0.2	0.3	0.0																															
S13	1.0	0.4	1.2	1.0	1.3	0.6	4.5	0.8	0.0	0.6	-0.2	1.5	2.5	-0.2	1.7	0.3	1.4	2.8	0.0	-0.1	2.2	-0.1	0.4	0.0																														
S12	-0.4	-1.0	-0.2	-0.8	-0.5	-1.0	0.0	-0.6	-0.7	0.1	-0.8	-1.0	0.9	-1.4	-0.6	-0.9	-0.9	1.1	-1.3	-1.4	-1.5	-2.0	-0.5	-1.0	-0.5																													
S11	-0.7	-1.5	-0.1	-1.6	-0.1	-2.6	1.3	-0.6	-1.9	-0.2	-1.7	-1.2	-0.2	-1.9	-0.4	0.2	-0.9	1.8	0.6	1.3	0.3	-0.5	1.6	-0.8	0.2	0.0																												
S10	-1.0	1.3	0.3	0.6	0.3	-0.2	3.5	0.6	-1.2	0.1	0.2	1.0	0.3	-0.5	0.1	-1.0	-0.5	0.6	-1.5	-1.3	-0.2	-1.1	0.6	0.3	0.5	0.9	0.5																											
S16	-1.7	-1.3	2.0	-0.4	1.7	1.5	1.3	1.8	1.4	1.2	1.2	0.9	0.0	0.7	-0.1	0.1	-0.6	3.4	1.2	0.6	0.3	1.1	-0.3	1.0	0.0	0.1	-0.5	0.4																										
S15	-1.3	-0.3	2.0	1.6	2.2	-0.9	-0.4	-0.3	1.0	0.9	0.3	-0.3	-1.0	-1.0	-1.8	-0.3	-1.4	3.6	0.4	0.0	0.7	0.2	-0.7	0.6	0.7	1.7	0.9	-0.8	0.0																									
S14	-1.4	-1.1	1.2	0.2	-0.1	-1.1	-0.4	0.1	-0.5	-0.6	-1.5	-1.0	-1.9	-2.1	-1.1	-0.4	-1.5	1.6	-0.1	0.1	-0.1	0.0	-1.7	-0.1	-1.1	-0.8	-1.1	0.3	0.3	-0.3																								
E6	0.0	1.5	2.1	1.4	2.1	1.6	5.3	2.2	0.7	2.0	1.5	0.5	2.2	1.8	3.3	2.0	0.9	2.6	2.6	0.9	2.0	1.6	1.6	2.8	0.8	1.3	2.7	1.0	3.3	0.7	-0.1																							
E4	-1.1	-0.3	0.0	-0.4	1.7	0.2	3.2	0.1	0.4	0.7	0.9	-0.3	-0.1	0.1	1.7	1.2	-0.2	2.2	1.2	0.9	1.2	-0.4	1.4	0.4	-0.5	1.2	-1.1	0.7	1.1	-0.4	-0.5	-0.2																						
E3	-1.6	-1.0	-2.3	-1.7	0.1	-0.4	3.6	0.5	-0.4	0.9	0.7	0.1	0.2	0.0	0.5	-0.5	0.4	1.8	0.3	-0.2	0.3	-1.5	0.8	1.1	-1.9	-0.8	-0.3	-0.5	-0.4	-0.6	0.1	-0.1	-0.2																					
E5	-1.1	-1.0	-0.7	-0.7	0.4	0.0	2.4	-1.5	-1.0	-0.2	0.6	0.2	0.3	-0.6	0.0	-0.8	0.3	2.3	-0.3	-0.3	-0.3	-0.1	0.1	0.1	-1.1	0.2	0.1	-1.0	1.2	-1.2	-1.1	0.2	-0.4	-0.2																				
E1	-0.2	-0.3	-0.6	-0.5	-0.3	-0.3	3.4	-0.3	-1.9	-0.1	-0.6	0.4	0.6	-0.1	0.7	0.0	0.4	1.4	-0.4	-0.6	1.2	-1.4	0.1	1.1	-1.0	-1.3	-0.9	0.3	0.6	-1.3	-1.6	-0.6	0.4	-0.1	-0.2																			
E2	-1.3	-2.0	-1.2	-1.7	-1.7	-0.7	2.1	-0.3	-1.9	-0.9	-1.8	-0.5	-1.3	-1.3	-0.5	-0.3	-1.6	0.1	-0.4	-1.8	-1.1	-2.0	-0.4	0.2	0.2	0.1	-0.1	-0.7	0.6	-0.8	0.7	-0.9	-0.6	-0.5	-0.2	-0.6																		
E15	0.0	0.1	0.2	-0.5	2.0	1.4	2.1	2.0	1.8	1.8	0.7	1.0	0.6	0.7	2.3	1.0	1.3	3.2	2.0	2.5	3.0	0.7	2.8	1.2	-1.1	0.7	1.2	2.5	2.5	2.8	0.3	-0.9	-1.4	0.0	-0.5	-2.5	0.2																	
E13	-0.1	1.0	1.0	1.9	0.1	0.0	1.5	0.0	-0.9	-0.1	-1.6	0.5	0.3	-1.1	0.6	-0.2	-1.8	2.0	0.7	-0.7	0.2	-2.4	2.4	1.5	-0.1	0.8	0.4	-1.3	0.5	-0.3	1.4	1.7	-0.1	2.0	1.3	1.7	0.0	0.2																
E14	0.7	0.1	0.8	1.0	0.6	0.2	-1.0	0.2	0.3	0.2	0.1	0.0	0.8	-0.6	-0.2	-0.8	-1.9	0.9	-0.4	0.2	-0.7	-1.1	-1.6	1.1	0.7	0.5	0.0	1.4	1.6	0.5	1.3	3.2	0.1	1.2	2.2	-0.2	-1.8	0.4	0.2															
E11	0.4	-0.2	1.4	0.5	1.4	1.6	1.6	0.1	1.2	0.5	-0.4	0.7	0.2	0.3	0.4	0.6	-1.0	2.0	0.2	-0.1	0.7	-1.0	2.1	1.1	0.0																													

Table no. 6.8 Psychometric Properties of the Measurement Model for Customer Engagement (Uni-dimensional) and Customer Satisfaction (Multi-dimensional)

Parameter	Index	Construct	Dimension	Std Factor Loading	AVE	CR
Chi-square	2559.398	Engagement	Human-based customer engagement	0.82	0.599	0.899
Degree of Freedom	846		Machine-based customer engagement	0.8	0.527	0.886
Chi-square/ df	3.025	Satisfaction	Network	0.77	0.522	0.916
GFI	0.872		Value	0.75	0.904	0.511
AGFI	0.857		Care	0.85	0.842	0.571
NFI	0.876		Experience	0.81	0.8	0.501
CFI	0.913		Delight	0.71	0.795	0.565
RMR	0.144					
REMSA	0.05					

6.2.3.2 Structural Model of Customer Engagement (Uni- dimensional) → Satisfaction (Multi-dimensional)

The structural relationship between customer engagement (Uni-dimensional) and satisfaction (Multi- dimensional) has been assessed through a structural model (Figure no. 6.6). Customer engagement has been considered an exogenous variable and satisfaction is defined as an endogenous variable. The causal relationship between these constructs has been disclosed through a single-headed arrow. The model fit indices have been assessed to examine the goodness of fit of the structural model. R square has been assessed to measure the degree of explained variance. Structural parameter estimate has been referred to measure the extent and significance of the contribution of the predictive variable towards the explained variance of the endogenous variable.

The structural model reveals the ratio of Chi-square to df (2661.044/856) =3.109; GFI =0.866; AGFI =0.862; NFI =0.871; CFI =0.908; RMR =0.155; and RMSEA =0.051, Normed Chi-square between 3.0 to 5.0 which is acceptable cut off of 5.0(Hu & Bentler,1999). CFI

exceed the threshold of 0.90. RMSEA fall below the cut-off of 0.08, GFI, AGFI and NFI were very nearer to the conservative cut-off of 0.90 (Joreskog&Sorbom, 1993; Hair *et al.*, 2008; Hooper *et al.*, 2008) but much beyond the progressive cut off of 0.80 (Brett &Drasgow, 2002; Kanste *et al.*,2007; Horzum& Cakir,2009; Herzog,2011). Given the complexities of the present model, the GFI, AGFI and NFI were quite adequate for the study. Hence, we can conclude that model can be used for further analysis.

The assessment of the structural parameter estimates of the specified path (i.e., engagement and satisfaction) reveals a critical ratio of engagement (Uni dimensional) and satisfaction (multi-dimensional), which was much beyond the cut-off of 1.96. The significant beta coefficient of the specified path affirms the positive and significant effect of customer engagement and satisfaction.

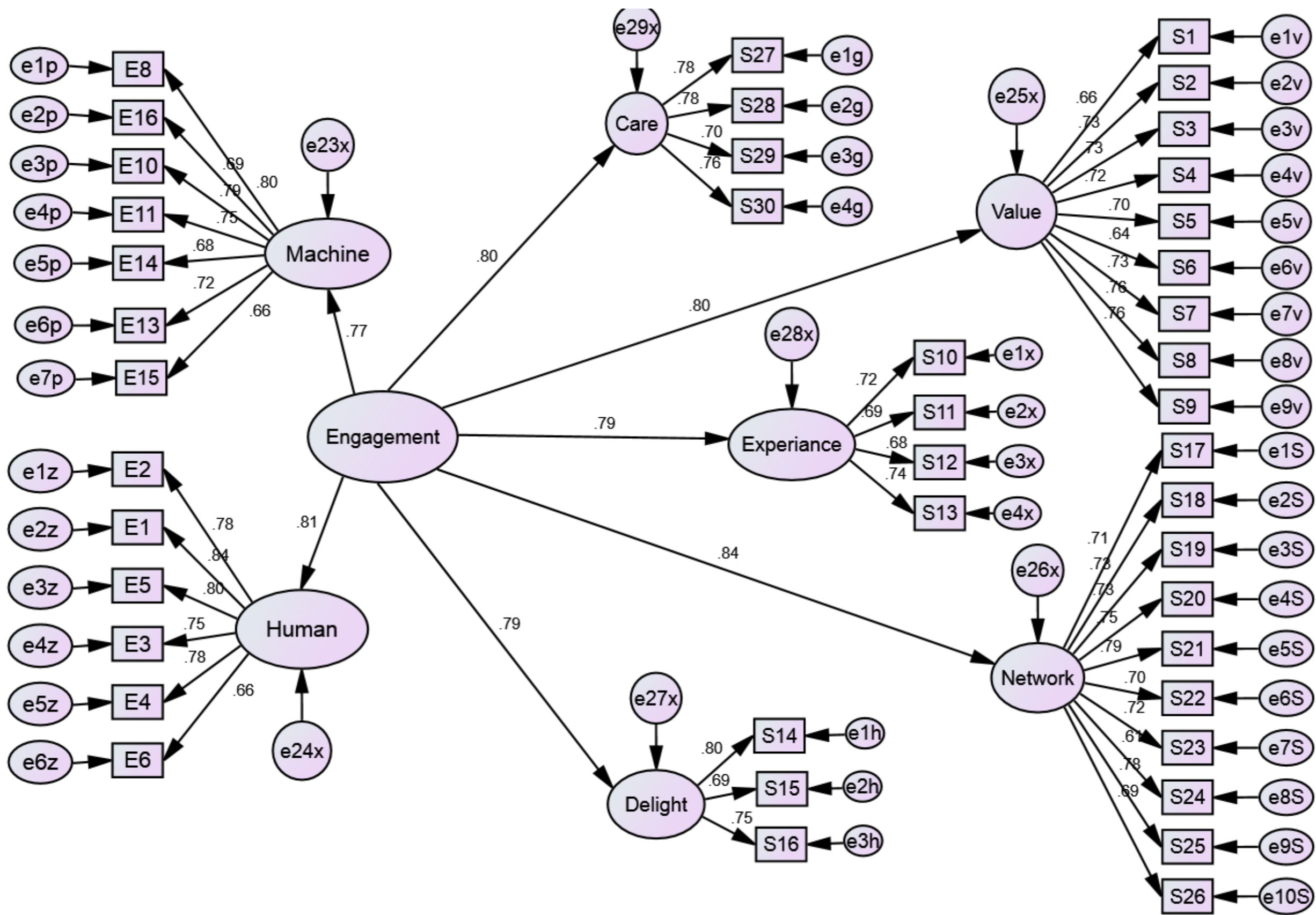


Figure no. 6.6 Structural Model for Customer Engagement (Uni-dimensional) and Satisfaction (Multi-dimensional)

Table no. 6.9 Model Fit Indices and Path coefficients of Customer Engagement (Uni - dimensional) and Satisfaction (Multi-dimensional)

Parameter	Measurement Model	Structural Model
Chi-square	2559.398	2661.044
Degree of Freedom	846	856
Normed Chi-square (Chi-square/ df)	3.025	3.109
GFI	0.872	0.866
AGFI	0.857	0.862
NFI	0.876	0.871
CFI	0.913	0.908
RMR	0.144	0.155
REMSA	0.050	0.051
Path analysis		
Path details	Critical Ratio	Path Coefficient
Engagement -->Care	18.561	0.80
Engagement -->Value	16.632	0.80
Engagement -->Experience	18.973	0.79
Engagement -->Network	18.419	0.84
Engagement -->Delight	19.898	0.79

Significance level $p=0.001$

6.2.4 Model 4: Customer Engagement (Multi-dimensional) and Satisfaction (Multi-dimensional)

The below section presents the measurement and structural model of Customer Engagement (Multi-dimensional) and Satisfaction (Multi- dimensional)

6.2.4.1 Measurement Model of Customer Engagement (Multi-dimensional) and Satisfaction (Multi-dimensional)

To study the customer engagement and satisfaction relationship, the measurement model is developed with customer engagement (multi-dimensional) and satisfaction (multi-dimensional).

The result of the measurement model (Figure no 6.7) shows that a Chi-square index of 2540.665 with 841 degrees of freedom i.e., a Normed Chi-square index of 3.021, GFI = 0.873; AGFI = 0.857; NFI = 0.877; CFI = 0.914; RMR = 0.142 and RMSEA = 0.050. Standardized residuals (Table no. 6.10). The results show that the Normed Chi-square is between 3.0 to 5.0 which is an acceptable cut-off of 5.0(Hu & Bentler,1999). CFI exceed the threshold of 0.90. RMSEA fall below the cut-off of 0.08. GFI, AGFI and NFI were very nearer to the conservative cut-off of 0.90 (Joreskog&Sorbom, 1993; Hair *et al.*, 2008; Hooper *et al.*, 2008) but much beyond the progressive cut-off of 0.80 (Brett & Drasgow, 2002; Kanste *et al.*,2007; Horzum & Cakir, 2009; Herzog, 2011). Given the complexities of the present model, the GFI, AGFI and NFI were quite adequate for the study. Further low standardized residuals (Table no. 6.10) confirm the claim that the pattern of relationships stated in the specified model was similar to the pattern of relationships expressed by the data.

Table no. 6.11 reveals that CR is above 0.6, and AVE is above 0.50 is within the acceptable range for all constructs for validity. Hence, we can conclude that model can be used for further analysis.

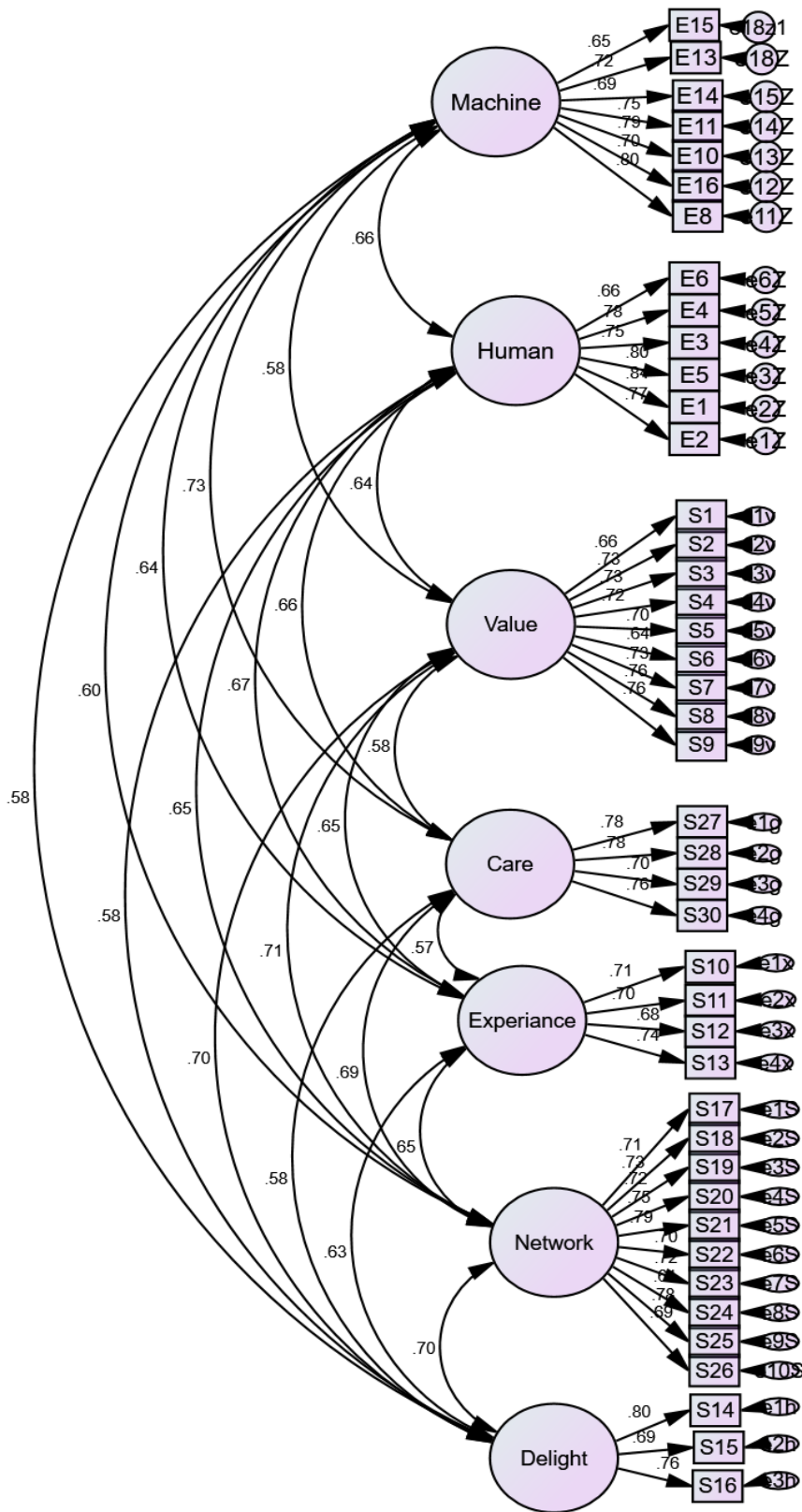


Figure no. 6.7: Measurement Model for Engagement (Multi-dimensional) and Satisfaction (Multi-dimensional)

Table no. 6.10: Standardized Residual Covariances of Engagement (Multi-dimensional) and Satisfaction (Multi-dimensional)

	S30	S29	S28	S27	S26	S25	S24	S23	S22	S21	S20	S19	S18	S17	S9	S8	S7	S6	S5	S4	S3	S2	S1	S13	S12	S11	S10	S16	S15	S14	E6	E4	E3	E5	E1	E2	E15	E13	E14	E11	E10	E16	E8					
S30	0.0																																															
S29	1.2	0.0																																														
S28	-0.6	-0.4	0.0																																													
S27	0.2	-0.6	0.3	0.0																																												
S26	0.1	1.3	1.3	0.4	0.0																																											
S25	2.4	0.5	3.6	2.0	-1.1	0.0																																										
S24	1.3	4.6	1.3	1.3	-0.7	-0.7	0.0																																									
S23	-1.2	0.2	0.2	-1.5	0.0	0.2	-1.0	0.0																																								
S22	-1.7	-2.3	-0.6	-1.7	1.4	-0.2	-0.1	-0.5	0.0																																							
S21	-1.1	-1.0	-0.4	-1.1	-1.2	0.5	-0.2	0.6	-0.6	0.0																																						
S20	-1.5	-0.7	-0.1	-0.3	0.8	-0.6	-0.5	0.4	1.8	-0.7	0.0																																					
S19	0.4	-0.6	0.4	0.5	0.2	0.2	-1.0	0.6	-0.6	0.2	0.0	0.0																																				
S18	-0.1	-0.9	0.1	0.0	-1.8	0.4	1.2	-1.2	0.0	1.3	-0.6	0.8	0.0																																			
S17	-1.7	-0.2	0.0	-2.5	0.6	0.2	-0.7	0.6	0.3	-0.3	0.9	-0.4	0.4	0.0																																		
S9	0.0	1.5	0.9	-0.2	3.9	0.8	4.2	1.3	-0.4	2.0	1.5	0.7	0.6	1.6	0.0																																	
S8	-2.2	-1.7	0.9	-0.6	2.2	-0.9	1.0	-0.7	-0.3	0.1	-0.4	-1.7	-0.8	-0.1	-0.7	0.0																																
S7	-0.5	0.5	-0.3	-1.9	2.8	-0.8	1.8	-0.8	-1.3	0.2	-0.4	-0.9	-1.7	-1.1	2.3	0.6	0.0																															
S6	0.1	1.9	2.2	1.0	2.6	1.5	1.9	1.2	1.7	1.2	1.8	0.2	1.0	1.3	-1.7	-0.6	-0.5	0.0																														
S5	-1.8	0.1	0.2	-0.1	3.0	0.0	1.5	-1.5	1.0	-0.5	-1.1	-2.4	-0.3	-0.7	-0.7	0.0	-0.7	-0.9	0.0																													
S4	-0.5	0.3	1.4	-1.0	2.1	-0.2	0.6	0.6	-0.3	-0.3	-0.3	-2.5	-1.6	0.5	-0.5	0.8	-0.8	0.7	1.1	0.0																												
S3	0.1	1.6	0.1	1.2	3.0	-1.8	1.2	-2.3	-1.9	-1.5	-2.3	-2.2	-2.0	-2.5	0.5	-0.6	-0.2	-0.7	1.2	0.0	0.0																											
S2	-1.4	0.8	0.4	-0.4	2.3	-0.5	2.2	0.5	0.2	-0.1	0.0	-1.1	-2.0	-2.4	0.3	0.2	-0.1	-0.5	0.3	-0.3	0.3	0.0																										
S1	-1.1	1.0	-0.5	0.3	-0.9	-0.7	3.1	0.5	0.9	1.0	-2.3	-0.6	-0.4	-0.4	-1.0	1.2	-0.5	1.8	-0.5	-0.5	-0.2	0.3	0.0																									
S13	1.0	0.4	1.2	1.0	1.3	0.6	4.5	0.8	0.0	0.6	-0.2	1.5	2.5	-0.2	1.7	0.3	1.4	2.8	0.0	-0.1	2.2	-0.1	0.4	0.0																								
S12	-0.4	-1.0	-0.2	-0.8	-0.5	-1.0	0.0	-0.6	-0.7	0.1	-0.8	-1.0	0.9	-1.4	-0.6	-0.9	-0.9	1.1	-1.3	-1.4	-1.5	-2.0	-0.5	-1.0	-0.5																							
S11	-0.7	-1.5	-0.1	-1.6	-0.1	-2.6	1.3	-0.6	-1.9	-0.1	-1.7	-1.2	-0.2	-1.9	-0.4	0.2	-0.9	1.8	0.6	1.3	0.3	-0.5	1.6	-0.8	0.2	0.0																						
S10	-1.0	1.3	0.3	0.8	0.3	-0.2	3.5	0.6	-1.2	0.1	0.2	1.0	0.3	-0.5	0.1	-1.0	-0.5	0.6	-1.5	-1.3	-0.2	-1.1	0.6	0.3	0.5	0.9	0.5																					
S16	-1.7	-1.3	2.0	-0.4	1.7	1.5	1.3	1.8	1.4	1.2	1.2	0.9	0.0	0.7	-0.1	0.1	-0.6	3.4	1.2	0.6	0.3	1.1	-0.3	1.0	0.0	0.1	-0.5	0.4																				
S15	-1.3	-0.3	2.0	1.6	2.2	-0.9	-0.5	-0.3	1.0	0.9	0.3	-0.3	-1.0	-1.0	-1.8	-0.3	-1.4	3.6	0.4	0.0	0.7	0.2	-0.7	0.6	0.7	1.7	0.9	-0.8	0.0																			
S14	-1.4	-1.1	1.2	0.2	-0.1	-1.1	-0.4	0.1	-0.5	-0.6	-1.5	-1.0	-1.9	-2.1	-1.1	-0.4	-1.5	1.6	-0.1	0.1	-0.1	0.0	-1.7	-0.1	-1.1	-0.8	-1.1	0.3	0.3	-0.3																		
E6	0.6	2.0	2.8	2.0	1.9	1.4	5.2	2.1	0.6	1.9	1.4	0.4	2.1	1.6	3.1	1.7	0.7	2.4	2.4	0.6	1.8	1.4	1.4	2.8	0.7	1.3	2.7	1.1	3.4	0.8	0.0																	
E4	-0.4	0.3	0.7	0.3	1.6	0.0	3.0	-0.1	0.2	0.4	0.6	-0.5	-0.3	-0.1	1.4	0.9	-0.5	1.9	1.0	0.6	0.9	-0.7	1.2	0.4	-0.6	1.2	-1.1	0.8	1.2	-0.3	-0.3	0.0																
E3	-0.9	-0.4	-1.7	-1.1	-0.1	-0.6	3.4	0.3	-0.6	0.7	0.5	-0.1	0.0	-0.2	0.2	-0.8	0.1	1.5	0.0	-0.5	0.0	-1.8	0.5	1.0	-1.9	-0.9	-0.3	-0.4	-0.4	-0.5	0.3	0.1	0.0															
E5	-0.4	-0.4	0.0	0.0	0.2	-0.2	2.2	-1.7	-1.2	-0.5	0.4	0.0	0.1	-0.8	-0.3	-1.1	0.0	2.0	-0.6	-0.5	-0.6	-0.4	-0.2	0.1	-1.2	0.1	0.0	-0.9	1.3	-1.1	-0.9	0.4	-0.2	0.0														
E1	0.5	0.4	0.2	0.2	-0.5	-0.5	3.3	-0.6	-2.1	-0.4	-0.8	0.2	0.3	-0.3	0.4	-0.3	0.1	1.1	-0.6	-0.9	0.9	-1.7	-0.2	1.1	-1.0	-1.4	-1.0	0.4	0.7	-1.2	-1.4	-0.3	0.6	0.2	0.0													
E2	-0.5	-1.2	-0.4	-0.8	-1.7	-0.7	2.1	-0.3	-1.9	-0.9	-1.9	-0.6	-1.3	-1.3	-0.6	-0.4	-1.7	0.0	-0.5	-1.9	-1.2	-2.1	-0.5	0.4	0.3	0.2	0.1	-0.4	0.9	-0.5	1.2	-0.4	-0.2	0.0	0.4	0.0												
E15	-0.6	-0.5	-0.4	-1.1	2.2	1.7	2.3	2.2	2.0	2.1	0.9	1.3	0.8	0.9	2.6	1.3	1.6	3.5	2.3	2.8	3.3	1.0	3.1	1.2	-1.0	0.8	1.3	2.4	2.5	2.7	0.4	-0.8	-1.4	0.0	-0.4	-2.3	0.0											
E13	-0.8	0.4	0.2	1.2	0.3	0.3	1.7	0.2	-0.7	0.1	-1.4	0.7	0.6	-0.9	1.0	0.1	-1.5	2.3	0.9	-0.4	0.5	-2.1	2.7	1.6	0.0	0.8	0.4	-1.4	0.4	-0.4	1.4	1.7	-0.1	2.0	1.3	1.9	-0.1	0.0										
E14	0.0	-0.5	0.2	0.3	0.8	0.4	-0.8	0.4	0.5	0.4	0.3	0.2	1.0	-0.5	0.1	-0.5	-1.6	1.1	-0.2	0.5	-0.4	-0.8	-1.4	1.2	0.7	0.5	0.1	1.3	1.5	0.4	1.3	3.2	0.1	1.2	2.2	0.0	-2.0	0.1	0.0									
E11	-0.3	-0.8	0.7	-0.2	1.6	1.8	1.8	0.3	1.4	0.8	-0.2	0.9	0.5	0.5	0.8	0.9	-0.7	2.3	0.5	0.2	1.0	-0.6	2.4	1.1	0.1	1.0	0.7	1.0	1.1	0.9	0.9	1.5	-1.4	0.4	0.4	0.8	1.3	0.1	0.3	0.0								
E10	0.9	1.3	0.0	-0.2	1.7	0.5	2.0	0.1	-0.2	0.4	-0.4	0.9	0.4	-0.7	0.8	-0.3	0.2	0.3	-0.2	-1.2	0.9	-0.6	1.0	0.5	0.0	0.9	-0.1	0.8	0.0	-1.5	-1.4	1.4	-1.2	-0.5	0.4	-1.1	-0.9	-0.6	-0.2	-0.1	0.0							
E16	0.7	0.5	0.0	0.4	-0.4	-0.3	-1.7	-1.8	-2.5	-0.9	-2.6	-1.3	-0.1	-2.6	-0.9	-1.5	-1.7	-0.8	-1.0	-1.2	0.0	-2.5	-1.5	-0.7	-0.7	-1.1	-1.5	-2.3	0.5																			

Table no.6.11: Psychometric Properties of the Measurement Model for Customer Engagement (Multi-dimensional) and Satisfaction (Multi-dimensional)

Parameter	Index	Construct	Dimension	AVE	CR
Chi-square	2540.655	Engagement	Human-based customer engagement	0.591	0.888
Degree of Freedom	841		Machine-based customer engagement	0.591	0.896
Chi-square/ df	3.021	Satisfaction	Network	0.520	0.915
GFI	0.873		Value	0.512	0.904
AGFI	0.857		Care	0.572	0.842
NFI	0.877		Experience	0.503	0.802
CFI	0.914		Delight	0.559	0.791
RMR	0.142				
REMSA	0.050				

6.2.4.2 Structural Model of Customer Engagement (Multi-dimensional) and Satisfaction (Multi-dimensional)

The result of the structural model reveals (Figure no. 6.8) a Chi-square index of 2895.276 with 851 degree of freedom i.e., a Normed Chi-square index of 3.402, GFI = 0.853; AGFI = 0.836; NFI = 0.860; CFI = 0.896; RMR = 0.198 and RMSEA = 0.055. CFI is near the threshold of 0.90. RMSEA fall below the cut-off of 0.08. CFI, GFI, AGFI and NFI were very nearer to the conservative cut-off of 0.90 (Joreskog & Sorbom, 1993; Hair *et al.*, 2008; Hooper *et al.*, 2008) but much beyond the progressive cut-off of 0.80 (Brett & Drasgow, 2002; Kanste *et al.*, 2007; Horzum & Cakir, 2009; Herzog, 2011). Given the complexities of the present model, the CFI, GFI, AGFI and NFI were quite adequate for the study. Hence, we can conclude that model can be used for further analysis.

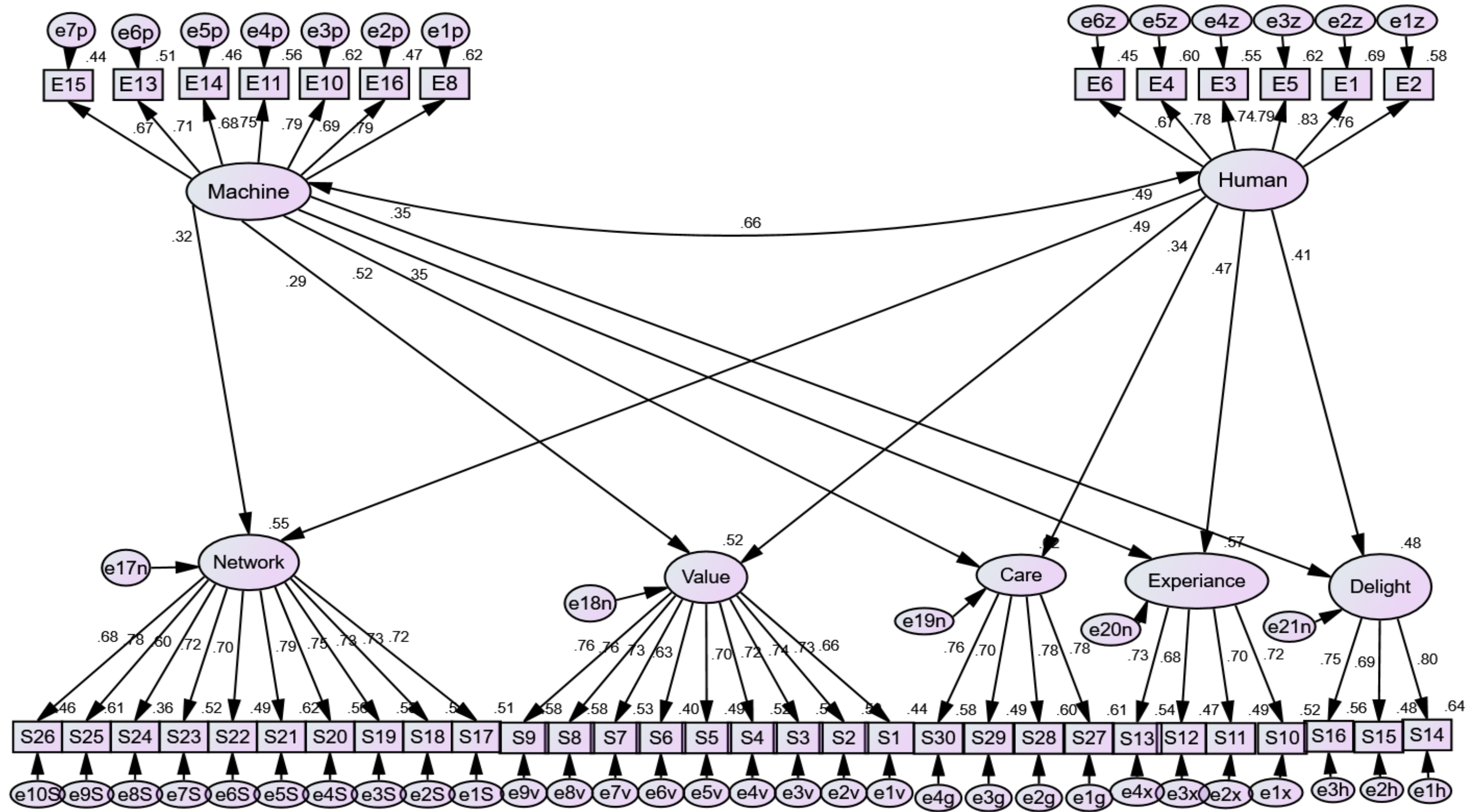


Figure no. 6.8: The Structural Model Engagement (Multi-dimensional) and Satisfaction (Multi-dimensional)

**Table no. 6.12: Model Fit Indices and Path Coefficients of Customer Engagement
(Multi-dimensional) and Satisfaction (Multi-dimensional)**

Parameter	Measurement Model	Structural Model
Chi-square	2540.655	2895.276
Degree of Freedom	841	851
Normed Chi-square (Chi-square/ df)	3.021	3.402
GFI	0.873	0.853
AGFI	0.857	0.836
NFI	0.877	0.860
CFI	0.914	0.896
RMR	0.142	0.198
REMSA	0.050	0.055
Path analysis		
Path details	Critical Ratio	Path Coefficient
Human-based Customer Engagement → Value	10.130	0.49
Human-based Customer Engagement → Experience	9.757	0.47
Human-based Customer Engagement → Care	7.850	0.34
Human-based Customer Engagement → Delight	8.226	0.41
Human-based Customer Engagement → Network	10.523	0.49
Machine-based Customer Engagement → Value	6.608	0.29
Machine-based Customer Engagement → Experience	7.539	0.35
Machine-based Customer Engagement → Care	11.152	0.52
Machine-based Customer Engagement → Delight	7.127	0.35
Machine-based Customer Engagement → Network	7.524	0.32

6.3 RESULT AND DISCUSSION

To study the customer engagement and satisfaction relationship, four models were developed as below

Model 1: Customer Engagement (Uni- dimensional) → Satisfaction (Uni- dimensional)

Model 2: Customer Engagement (Multi- dimensional) → Satisfaction (Uni- dimensional)

Model 3: Customer Engagement (Uni- dimensional) → Satisfaction (Multi- dimensional)

Model 4: Customer Engagement (Multi- dimensional) → Satisfaction (Multi- dimensional)

The model fit indices for the four structural models are shown below in Table no. 6.13.

Table no. 6.13: Model Fit Indices for the Structural Models

Parameter	Model 1	Model 2	Model 3	Model 4
Chi-square	2655.175	2654.762	2661.044	2895.276
Degree of Freedom	855	854	856	851
Normed Chi-square (Chi-square/ df)	3.105	3.109	3.109	3.402
GFI	0.867	0.867	0.866	0.853
AGFI	0.853	0.853	0.862	0.836
NFI	0.871	0.871	0.871	0.860
CFI	0.909	0.909	0.908	0.896
RMR	0.154	0.154	0.155	0.198
REMSA	0.051	0.051	0.051	0.055

Model 1:

The model fit indices result of the measurement model and structural model is not showing any variance. The result of the structural model on Customer Engagement (Uni- dimensional) → Satisfaction (Uni- dimensional) reveals that the high value of R square 0.92 and the critical ratio of 15.312 justifies the significant effect of customer engagement on customer satisfaction. The same can be reconfirmed by a higher path coefficient of 0.96 at a significance level of $p=0.001$.

Model 2:

The model fit indices result of the measurement model and structural model is not showing any variance. The result of the structural model on Customer Engagement (Multi-dimensional) → Satisfaction (Uni-dimensional) shows that the R square value of 0.73 justifies the significant effect of customer engagement on customer satisfaction. The study of the model reveals that Human-based Customer Engagement → Satisfaction path, has a critical ratio of 10.857 with a path coefficient of 0.51 and the study of Machine-based Customer Engagement → Satisfaction path shows a critical ratio of 9.823 and path coefficient of 0.43 at a significance level of $p=0.001$. Reveals the significant effect of customer engagement (multi-dimensional) on customer satisfaction (uni-dimensional).

Model 3:

The model fit indices result of the measurement model and structural model is showing little variance. The result of the structural model on Customer Engagement (uni-dimensional) → Satisfaction (multi-dimensional) is shown below.

Path: Customer Engagement → Value, critical ratio =16.632 and path coefficient =0.8: shows a significant effect of Human-based Customer Engagement on Value

Path: Customer Engagement → Experience, critical ratio =18.973 and path coefficient =0.79: shows a significant effect of Machine-based Customer Engagement on Experience

Path: Customer Engagement → Care, critical ratio =18.561 and path coefficient =0.8: shows a significant effect of Human-based Customer Engagement on Care

Path: Customer Engagement → Delight, critical ratio =19.898 and path coefficient =0.79: shows a significant effect of Human-based Customer Engagement on Delight

Path: Customer Engagement → Network, critical ratio =18.419 and path coefficient =0.84: shows a significant effect of Human-based Customer Engagement on Network

Significance level of $p=0.001$.

Model 4:

The model fit indices result of the measurement model and structural model is showing little variance. The result of the structural model on Customer Engagement (multi-dimensional) → Satisfaction (multi-dimensional) is shown below.

Path: Human-based Customer Engagement → Value, critical ratio =10.130 and path coefficient =0.490: shows a significant effect of Human-based Customer Engagement on Value

Path: Human-based Customer Engagement → Experience, critical ratio =9.757 and path coefficient =0.47: shows a significant effect of Machine-based Customer Engagement on Experience

Path: Human-based Customer Engagement → Care, critical ratio =7.850 and path coefficient =0.34: shows a significant effect of Human-based Customer Engagement on Care

Path: Human-based Customer Engagement → Delight, critical ratio =8.226 and path coefficient =0.41: shows a significant effect of Human-based Customer Engagement on Delight

Path: Human-based Customer Engagement → Network, critical ratio =10.523 and path coefficient =0.490: shows a significant effect of Human-based Customer Engagement on Network

Path: Machine-based Customer Engagement → Value, critical ratio =6.608 and path coefficient =0.290: shows a weak significant effect of Machine-based Customer Engagement on Value

Path: Machine-based Customer Engagement → Experience, critical ratio =7.539 and path coefficient =0.35: shows a significant effect of Machine-based Customer Engagement on Experience

Path: Machine-based Customer Engagement → Care, critical ratio =11.152 and path coefficient =0.52: shows a significant effect of Machine-based Customer Engagement on Care

Path: Machine-based Customer Engagement → Delight, critical ratio =7.127 and path coefficient =0.35: shows a significant effect of Machine-based Customer Engagement on Delight

Path: Machine-based Customer Engagement → Network, critical ratio =7.524 and path coefficient =0.32: shows a significant effect of Machine-based Customer Engagement on Value

Significance level of $p=0.001$.

The findings of the study provide sufficient evidence to reject the null hypothesis of no significant impact of customer engagement on customer satisfaction. The study highlights that customer engagement impacts customer satisfaction. The results reveal the higher importance of human-based engagement channels viz-a-viz of machine-based engagement imitative.

CHAPTER VII

FINDINGS, RECOMMENDATIONS, IMPLICATIONS AND LIMITATIONS

The first section of this chapter presents the findings of the study. The implication of the study has been presented in the second section of this chapter; the third section concludes the study. The recommendation has been also given at the end of the section. The limitation and scope of future research are presented in the last section of this chapter.

7.1 FINDINGS AND DISCUSSION

The study is motivated to conceptualize customer engagement in the context of the Indian telecom sector and to identify various attributes of customer engagement. The present study describes customer engagement as a strategic action by service providers to connect with their customers. The study presents a call centre, multibrand outlet, retailer, written letter, franchisee store, company store, mobile app, SMS, webchat, interactive voice response, third party app, emails, and websites as important attributes of customer engagement. It is interesting to note that the attributes identified in the study can be clubbed into two major factors i.e., Human-based customer engagement and Machine-based customer engagement. The results of EFA and CFA define attributes such as call centre, multibrand outlet, retailer, written letter, franchisee store and company store as an integral part of Human-based customer engagement. Similarly, the attributes such as mobile app, SMS, webchat, interactive voice response, third party app, emails, and websites constitute Machine-based customer engagement.

Though Human-based customer engagement and Machine-based customer engagement are integral parts of the customer engagement construct both have their own relevance. Human-based customer engagement is a critical element of customer engagement for Indian mobile customers as this is the only source of engagement with the mobile service provider for non-data (internet) users. India still contributes about 50 per cent of the customers with basic/feature phones hence their primary source of engagement with the service provider is human-based customer engagement only. The findings are in line with the results of the Bharat 2.0 Internet Study, which revealed that 60 per cent of the rural population and 41 per cent of consumers in Urban India has limited access to the internet, highlighting the need for human-based customer engagement channels (Agarwal,2022; Jha, 2022).

Machine-based customer engagement is equally critical because of changing scenario of the Indian telecom sector where a lot of emphases has been given to digitization (Dwivedi *et al.*, 2021).

As far as the dimensionality of customer engagement is concerned, the results acknowledge the validity of uni-dimensional as well as multi-dimensional conceptualization of the customer engagement construct. Under multi-dimensional conceptualization of customer engagement, Human-based customer engagement and Machine-based customer engagement distinctively impacts various other attributes of customer behaviour such as customer satisfaction.

The present study shows that in the Indian telecom, context human-based customer engagement initiatives play a greater role viz-a-viz machine-based customer engagement initiatives taken by various service providers. The human-based customer engagement initiatives explain 28.19 per cent variance while defining customer engagement construct viz-a-viz machine-based customer engagement which explains 26.59 per cent variance. The above findings are in line with the existing literature (e.g., Dinner *et al.*, 2015; Peltier *et al.*, 2016; Frimpong, 2017; McLean & Osei-Frimpong, 2017; Mckinsey,2017; Sharma, 2017; Kohlmeyer,2017; Appel *et al.*, 2019; Breuer *et al.*, 2020; Soluno, 2020; Breuer *et al.*,2020; Kumar, Comeche & Ruthven, 2021).

There is a double opinion regarding the dimensionality of the customer engagement construct. One set of studies (e.g., Flynn, 2012; Vivek *et al.*, 2014; Kuvykaitė & Tarutė, 2015; McKinsey, 2017) considers customer engagement as a uni-dimensional construct, whereas another set of studies (e.g., Brodie *et al.*, 2011; Vivek *et al.*, 2014) has affirmed the multi-dimensionality of the constructs. The supporters of the multi-dimensional view of customer engagement have emphasised the unique contribution of each sub-dimension while explaining the variance in the selected dependent variable such as customer satisfaction. Though the findings of the present study acknowledge the validity of uni-dimensional as well as multi-dimensional conceptualization of customer engagement construct it is the purpose of the study and the degree of granularity which justify the use of uni-dimensional or multi-dimensional conceptualization of customer engagement construct.

Customer satisfaction is one of the most crucial parameters for the success of any business. In the context of the Indian telecom sector, voice coverage, call drop, video buffering/streaming experience, online gaming experience, mobile network data coverage, voice quality, network busy or call congestion, SMS service, over-the-top (OTT),

communication, product tariff, value-added services (VAS), goodwill gesture, promise fulfilment, customer engagement activity, new technology products, new product information, documentation process, service consistency, solving customer issues, response, first time right, billing accuracy, delight are been defined as the major attributes of customer satisfaction.

The present study employed factor analysis and aggregate the various attributes into five factors (i.e., network, value, care, experience and delight) that define customer satisfaction. The study reveals that in the Indian telecom context *network* factor with 16.397 per cent, variance explained emerged as a more important factor while deciding on customer satisfaction followed by *value* which explains 16.120 per cent variance. The first factor i.e., network consists of voice coverage, call drop, video buffering/streaming experience, online gaming experience, mobile network data coverage, voice quality, network busy or call congestion and SMS service attributes. This factor highlights the relevance of wider and contentious coverage of the network at various geographical locations while defining customer satisfaction. The second factor i.e., Value includes attributes such as over-the-top (OTT), economical tariff plans, variety of tariff plans, value for money tariff plans, value-added services (VAS), goodwill gesture, promise fulfilment and communications its integral part. These findings are in line with the current business practice of the Indian telecom sector where almost all telecom operators are offering OTT products to their customers at discounted rates or bundled with mobile offers (Joshi *et al.*, 2015).

The third factor i.e. *Care* covers attributes such as new product information, new technology products, documentation process and service consistency. This factor explains an additional 10.49 per cent variance. The fourth factor *Experience* consists of solving customer issues, response, first time right, and billing accuracy covers a 10.381 per cent variance in customer satisfaction construct. The fifth factor *Delight* consists of feels good, meets my needs and happiness. *Delight* covers 8.520 per cent variance in customer satisfaction construct. The findings in the given study are in line with the literature (e.g., Cronin & Taylor,1992; Oliver,1997; Bolton *et al.*,2003; Kim *et al.*,2004; Haque *et al.*,2007; Shin & Kim,2008; Moraga *et al.*,2008; Wang *et al.*,2013).

The customer satisfaction constructs can be studied as uni-dimensional or multi-dimensional concepts. The uni-dimensional view of customer satisfaction (e.g., Chapman, 2003; Beatson *et al.*, 2006; Alam & Al-Amri, 2020) has considered the high degree of positive correlation between the different dimensions of customer satisfaction as a basis for

uni-dimensionality. On the other side, the support of a multi-dimensional view of customer satisfaction (e.g., Kosciulek, 2003; Beatson *et al.*, 2006; Consuegra *et al.*, 2007; Andreis & Ferrari, 2014; Van Scoyoc, 2019; Mu *et al.*, 2021) says that the different dimensions of customer satisfaction may relate differently with various other constructs of interest. Both of the arguments have a sound theoretical basis. So, in the context of the present study customer satisfaction construct has been conceptualized as a uni-dimensional as well as a multi-dimensional construct.

The customer demographic plays a critical role while deciding customer engagement and satisfaction, the present study attempted to study the association of customer demographic with customer engagement and customer satisfaction. In order to conduct the present study demographics selected were gender, age, education and occupation. The Chi-square test of association has been applied to assess the association of customer demographics with customer engagement and satisfaction.

The result of the study reveals a significant association of gender with customer engagement and satisfaction. It is interesting to note that gender plays a significant role across all models of customer engagement and satisfaction. The results show that companies in the telecom sector must consider the gender of their customer while defining their customer engagement and customer satisfaction strategy. The association of gender with customer engagement and satisfaction has meaningful implications for the industry. It might be possible that the need and usage of female customers in the telecom sector differ from the male customers and that might be the reason for the significant association of gender with customer engagement and satisfaction (GSMA, 2019). The mobile operator while describing a strategy for customer engagement and satisfaction must consider gender as an important factor.

The result of the study reveals that age plays a significant role in machine-based customer engagement and satisfaction. The study emphasizes that telecom companies must consider the age of their customer while defining their machine-based customer engagement strategy. The study highlights that companies need to focus on the age of the customers as an important factor while making strategies for network, value, care, experience and customer delight factors. The association of age with machine-based customer engagement and satisfaction has important implications for the telecom industry. It might be possible that the understanding or learning ability of customers may differ with the age bracket for machine-based customer engagement channels by of the Indian telecom customers and may result for

the significant association of age with machine-based customer engagement. It is interesting to note that age is not playing a significant role in the human-based customer engagement channel, this might be because of the maturity of the telecom industry in India.

The result of the study shows that education plays a significant role in customer engagement and satisfaction. Indian telecom companies must consider the education criteria of their customer while defining their strategy for customer engagement and customer satisfaction. The association of education with machine-based customer engagement, human-based engagement and satisfaction has important implications for the telecom industry, it might be possible that the language preference/constrain or learning ability of machine-based customer engagement channels of customers may differ across education levels of Indian telecom customers and that might be a reason for the significant association of the education with customer engagement. On the other side, customer needs and requirements may vary as per the customer educational level resulting in a significant association of education with customer satisfaction. It is notable that in the context of the present study, the association of education with sub-dimensions of customer satisfaction construct such as network, value, care, experience and delight turn insignificant and provide an opportunity for future investigation.

The result of the study reveals a significant association of occupation with customer engagement and customer satisfaction. The study shows that telecom companies must consider the occupation criteria of their customer while designing their customer engagement strategy for human-based and machine-based customer engagement service channels, on the other side companies need to focus on the occupation of the customer as an important factor while making a strategy for the customer satisfaction. The association of occupation with machine-based customer engagement and satisfaction has important implications for the telecom industry.

It might be possible that the needs and requirements of the service class and business class vary and need different kinds of engagement strategies. What satisfies a consumer from the business class may not be relevant for a consumer from the service class. It is interesting to note that the results of the present study do not find a significant association of occupation with various sub-dimensions of customer satisfaction i.e. network, value, care, experience and delight.

The analysis of the customer demographics with customer engagement and satisfaction can be shown in pictorial form as below

Demographic Association : Engagement and Satisfaction

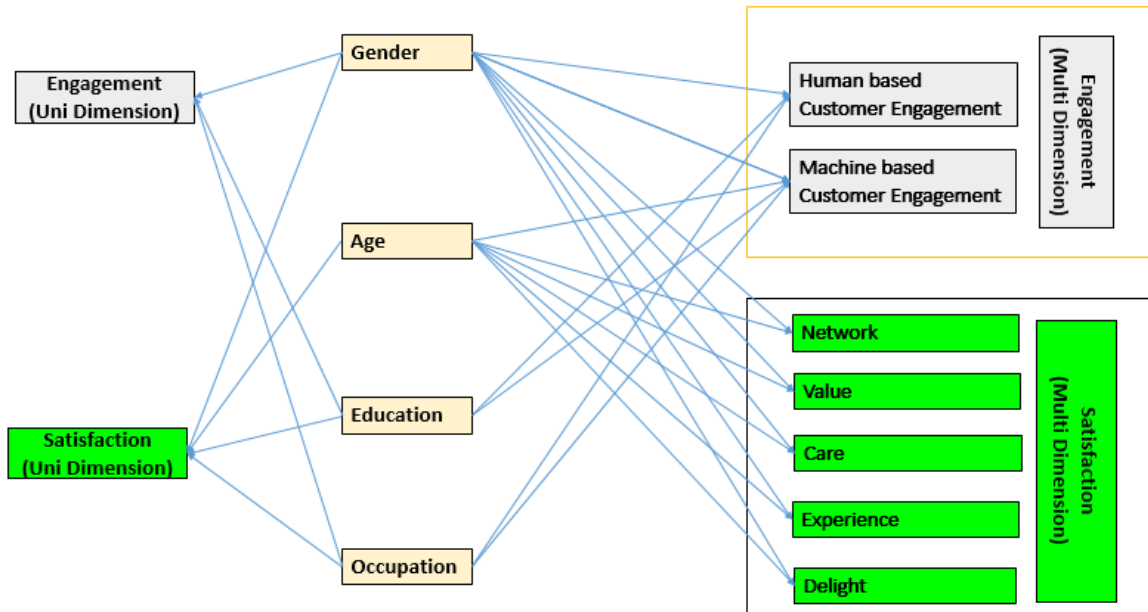


Figure no: 7.1: Demographic Association

The results of the present study found a significant association of customer demographic with customer engagement and customer satisfaction. The findings are in line with the literature (e.g. Webster, 1989; Levesque & McDoughall, 1996; Aliah, 1999; Zeithaml, 2000; Kassim, 2007; Oyewole, 2008; Qayyum *et al.*, 2013; Rai *et al.*, 2013; Christia & Ard, 2016; Volker *et al.* 2016; Koundinya, 2017).

In order to study customer engagement and Customer satisfaction relationship four models of Customer Engagement → Customer Satisfaction has been conceptualized and tested through structural equation modelling. The description of these is presented below.

Model 1: Customer Engagement (Uni- dimensional) → Satisfaction (Uni-dimensional)

Model 2: Customer Engagement (Multi- dimensional) → Satisfaction (Uni- dimensional)

Model 3: Customer Engagement (Uni- dimensional) → Satisfaction (Multi- dimensional)

Model 4: Customer Engagement (Multi- dimensional) → Satisfaction (Multi- dimensional)

Model 1 considers Customer Engagement, as well as Customer Satisfaction as a uni-dimensional construct and tests the impact of Customer Engagement on Customer Satisfaction. The result of the structural model reveals a significant effect of customer engagement on customer satisfaction.

Model 2 assesses the individual impact of human-based customer engagement and machine-based customer engagement on Customer Satisfaction by employing structural equation modelling. The result of the structural model reveals the significance of human-based customer engagement as well as machine-based customer engagement while describing Customer Satisfaction. The path coefficients for human-based customer engagement and machine-based customer engagement are 0.51 and 0.43. Though both sub-dimensions of customer engagement are significant sub-dimension of human-based customer engagement capture higher variance. This has an important implication for the management practitioner as well as academicians. The working personnel of various telecom companies may pay higher attention to human-based customer engagement channels under the present scenario of the Indian telecom sector. This is in contrast with the available literature in the Global context (McKinsey,2017). It is noteworthy that though in the present scenario, the telecom operator in India may emphasise the human-based customer engagement channels to better serve their customer but in the long run, the importance of machine-based customer engagement cannot be underestimated.

Model 3 considers Customer Engagement as a Uni-dimensional construct and describes Customer Satisfaction as a Multi-dimensional construct. This model attempts to describe the overall impact of Customer Engagement on various dimensions of Customer Satisfaction. The results reveal that customer engagement has a significant impact on customer satisfaction. The path analysis shows that the path coefficient of the network is 0.84 highest among all the factors followed by the value and care at 0.80 and experience and delight at 0.79.

Model 4 result of the structural model on Customer Engagement (Multi-dimensional) → Satisfaction (Multi-dimensional) shows the significant effect of human-based customer engagement and machine-based customer engagement (customer engagement factors) on value, experience, care, delight and network (customer satisfaction factors).

The path analysis reveals that human-based customer engagement is having a path coefficient of 0.49 for value and network factors. This may be because of human touch interference and the availability of network information with human-based customer engagement like stores, and call centre which is not available with machine-based customer engagement like IVR, and USSD. Here point to note that human-based customer engagement impacts the value factor, this may be because the customer feels more valued when he/she is

having human interaction than machine-level standard interaction interface conversation with the company.

The findings on this are in line with the literature (e.g., Kosciulek, 2003; Chapman, 2003; Beatson *et al.*, 2006; Consuegra *et al.*, 2007; Andreis & Ferrari, 2014; Vivek *et al.*, 2014; Kuvykaitė & Tarutė, 2015; McKinsey, 2017; Vanscoyoc, 2019; Alam & Al-Amri, 2020; Mu *et al.*, 2021).

The models structure can be shown below in pictorial format.

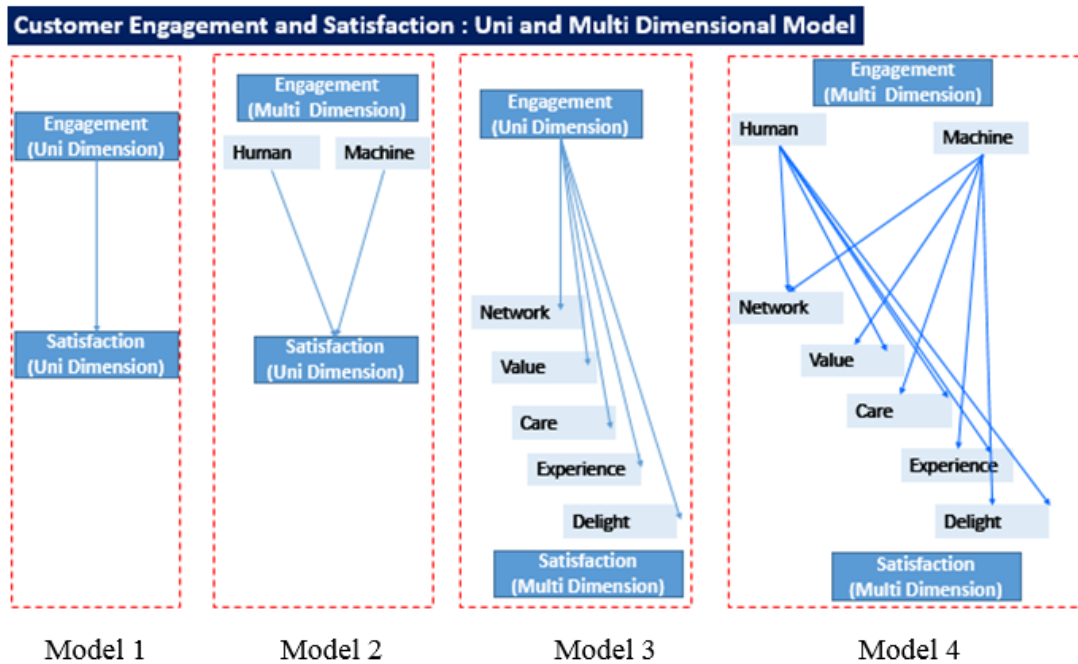


Figure no: 7.2: Customer Engagement and Satisfaction Model

The present study attempts to conceptualize customer churn in the context of the Indian telecom sector and to identify various attributes of customer churn. The study describes customer churn as a key actionable by the mobile service providers to sustain the business. The study presents network quality, service, product value, social influence, advertisement, and brand as key attributes to define customer churn. The analysis reveals that network quality which consists of data speed, network coverage, and voice calls is the most important factor covering 16.35 per cent variance. This draws the attention of telecom operators on providing a good data speed network to minimize customer churn. Service arrangement emerged as the second major factor describing customer churn. The study highlights the complex and inconvenient process, cumbersome documentation process, and the activation formalities adversely impact the association of customer with the service provider and generally results in customer churn. The third factor describing customer churn is product value. This factor explains the 15.49 per cent variance and has value-added services, tariffs,

and birthday/surprise gifts as an integral part. This finding has an important implication for management practitioners working in the Indian telecom sector. The study highlights that Indian telecom operators must focus on value-added services to retain their customers. Social influence has also emerged as one of the parameters while describing customer churn. The study reveals that the opinion and influence of corporate/family/colleagues play a crucial role in an individual's decision about the selection of a telecom operator and continuing their telecom services with the selected operator. The advertisement emerges as the fifth major component of customer churn constructs with a 13.45 per cent variance explained. The study highlights the relevance of promotional/ advertisement campaigns as a tool in the hand of corporates to convince their customers to continue their association with the selected operator. Brand value emerges as the sixth and final component of the customer churn construct. This attribute explains 11.82 per cent and highlights the importance of branding activities.

The findings in the present study are in line with the literature (e.g., Moraga *et al.*,2008; Lisbeth *et al.*,2010; Hollebeek,2011; Joshi,2012; Chakraborty & Sengupta,2013; Svendsen & Prebensen,2013; Hejazinia & Kazemi,2014; Chadha & Bhandari,2014; Gamulin *et al.*,2015; Solem,2016; Adebisi *et al.*,2016; Mahajan & Mahajan,2017; Akmal,2017; Ferreira *et al.*,2019; Stella,2019).

7.2 RECOMMENDATIONS

Based on the analysis and interpretation of data, in the previous chapters, the study comes out with the following recommendations

1. Human-based customer engagement and Machine- based customer engagement are integral parts of the customer engagement construct. The managerial personnel involved in the Indian Telecom sector need to pay equal emphasis on both i.e. Human-based and Machine- based channels of customer engagement.
2. The parameters such as network, value, care, experience and delight define the Customer satisfaction construct in the context of the Indian Telecom sector.
3. Customer satisfaction is one of the crucial parameters for the success of service providers in the Indian Telecom sector.
4. The need and usage of female customers in the telecom sector differ from those of male customers. The mobile operator while describing a strategy for customer engagement and satisfaction must consider gender as an important factor.

5. The age of respondents has no significant association with Human-based customer engagement channels. The service personnel deployed over various touchpoints need to consider people from all age groups with equal care and attention.
6. The age of respondents has a significant association with Machine-based customer engagement channels. The learning ability of customers of different age groups may differ and hence this needs to be considered by the service providers while describing their customer engagement strategy.
7. The age of respondents has a significant association with customer satisfaction. The service providers can initiate different measures to satisfy their customers of different age groups.
8. The education of respondents has a significant association with customer engagement as well as with customer satisfaction. The customer's needs and requirements may vary as per their educational level. The machine-based engagement initiatives may be more not work for respondents who have no formal education. The human-based engagement initiatives may be more suitable to satisfy this set of customers.
9. The occupation of respondents has a significant association with customer engagement as well as with customer satisfaction. What satisfies a consumer from the business class may not be relevant for a consumer from the service class. Telecom companies must consider the occupation criteria of their customer while designing their customer engagement strategy for human-based and machine-based customer engagement service channels, on the other side companies need to focus on the occupation of the customer as an important factor while making a strategy for customer satisfaction.
10. Customer engagement is a significant determinant of customer satisfaction. Though the results reveal the higher importance of human-based engagement channels viz-a-viz of machine-based engagement initiatives. But the importance of machine-based customer engagement cannot be underestimated.
11. Human-based customer engagement is a critical element of customer engagement for Indian mobile customers as this is the only source of engagement with the mobile service provider for non-data (internet) users.
12. Machine-based customer engagement is equally critical because of changing scenario of the Indian telecom sector where a lot of emphases have been given to digitization.
13. The study proposes network quality, service, product value, social influence, advertisement, and brand as key attributes of customer churn.

14. Network quality has emerged as the most significant reason for customer churn. The telecom operators must emphasize data speed, network coverage and quality of voice call to retain their customers.

7.3 CONCLUSION AND IMPLICATIONS

The telecommunication industry has emerged as one of the furthestmost dynamic industries in India, where mobile has become a household utility with the mobile penetration in India reaching 85.78per cent as of the end of Feb 2021. The total 4G mobile customer base in India improved to 929.37 million at the end of Aug 2021.

Digitalization has empowered the customer by giving power of universal pricing and market hence to succeed in the market companies need to have a customer engagement strategy. The study on customer engagement reveals that human-based customer engagement and machine-based customer engagement are the two important factors of customer engagement.

Significant Indian telecom customers are still using non-broadband services/non-internet users for them the only way to engage is human-based customer engagement, these users are daily wedges users and can't afford the smartphones hence they are engaging with the service provider by the call centre, store etc. which are human-based customer engagement. On the other side because of security reasons services like sim card exchange in case of loss or damaged SIM card, network resolution, network downtime information etc. is not available on the machine-based customer service channels resulting in customers being forced to interact through human-based customer engagement like a retail store. Hence despite digitalization human-based customer engagement is coming one of the critical factors of customer engagement.

The findings on the customer engagement and satisfaction factors and related studies on demographic association have provided insights that can be used by the industry while deciding their customer or product segmentation strategy.

Network and network quality are the most critical factors while deciding on customer satisfaction and churn. From a broader perspective, companies need to provide good network services to improve customer satisfaction and churn rate. Value and product value are the second most critical element for customer satisfaction and churn respectively, companies will surely lose their customer base and satisfaction level if they failed to provide value to customers (Chakraborty & Sengupta, 2014).

The results of the present study highlight that companies need to invest in network and provide value to compete in the telecom market. The mobile service provider with a good quality network with value offers will attract the customer base resulting increase in churn for an existing mobile service provider.

The study has important implications for management practitioners, academicians, researchers and society at large.

Implications for management practitioners/Industry:

The research findings can be used by cellular service providers while formulating their customer engagement, satisfaction and churn management strategies. It will also help the service providers to decide on their service channel strategy as well as formulate their marketing and investment strategy. The findings of this research convey a strong message to service providers that customer engagement is an important link between the service provider and the customer. It is proven that human-based customer engagement and machine-based customer engagement can influence customer satisfaction and companies must have a customer engagement strategy in place in their organization. These results are similar to the literature (e.g., Dinner *et al.*, 2015; Peltier *et al.*, 2016; Frimpong, 2017; McLean & Osei-Frimpong, 2017; Mckinsey,2017; Sharma, 2017; Kohlmeyer,2017; Appel *et al.*, 2019; Breuer *et al.*, 2020; Soluno, 2020; Breuer *et al.*,2020; Kumar, Comeche & Ruthven 2021).

A manager must understand that human and machine-based customer engagement is a very important factor in achieving customer satisfaction. Hence managers must focus on the service levels of these customer engagement channels, managers need to ensure the quality checks at engagement so that they should not provide defective service causing dissatisfaction to customers.

The structural analysis of customer engagement and satisfaction shows a positive relationship between customer engagement and satisfaction, this relationship study results are in line with the study made by Gerpott *et al.* (2001), Kim *et al.* (2004), Mckinsey (2017) and Hayden (2019). Managers should ensure that proper delivery of customer engagement through human-based customer engagement and proper quality checks should be done before the release of the machine-based customer channel scenario into the market.

The demographic study on customer engagement and satisfaction can be used by the manager to do the re-segmentation of the customer. The demographic study on gender, age

bracket, education and occupation can help to improve the customer engagement and satisfaction KPI.

The analyses on the churn show that network quality, service, product value, social influence, advertisement, and brand are the inflecting factors for customer churn. These findings are in line with the literature (Moraga *et al.*,2008; Lisbeth *et al.*,2010; Hollebeek,2011; Joshi,2012; Chakraborty & Sengupta,2013; Svendsen & Prebensen,2013; Hejazinia & Kazemi,2014; Chadha & Bhandari,2014; Gamulin *et al.*,2015; Solem,2016; Adebisi *et al.*,2016; Mahajan & Mahajan,2017; Akmal,2017; Ferreira *et al.*,2019; Stella,2019).

During the analysis of factors describing customer churn network quality is coming as the most important factor which is similar to the characteristics of network factors of the customer satisfaction constructs, hence the manager needs to look at the network quality parameters closely (Chadha & Bhandari,2014; Gamulin *et al.*,2015).

Implications for Academicians and Researchers:

The study attempts to contribute to the literature by providing empirical evidence about the customer engagement-satisfaction relationship in the Indian context. The study also attempts to enrich the literature by describing the reasons for customer churn in the context of the Indian telecom sector. The scales proposed for customer engagement, satisfaction and churn can be used by researchers /academicians to conduct future study. The finding and recommendations of the present study can be used by academicians for explaining the various facets of customer engagement and customer satisfaction constructs.

Implications for Society:

The finding and recommendations of the present study can be used by the various social and government bodies for policy making. The present study proposes that Human-based customer engagement and Machine- based customer engagement are integral parts of the customer engagement construct. The policy makes may define different policy guidelines for Human-based customer engagement and Machine- based customer engagement channels. On similar lines, TRAI may define different policy guidelines based on the demographic profiles of the consumer.

7.4 LIMITATION AND FUTURE SCOPE

This study shows the relationship between customer engagement and customer satisfaction construct and factors affecting customer churn. In the near-future relationship can be studied between customer engagement, satisfaction and churn constructs. And study can be extended to the demographic effect on the customer churn construct.

In this study, the demographic effect on customer engagement and satisfaction construct studied with gender, age, education and occupation, the study can be further extended to other demographics like income group, rural/urban etc.

The present study shows the customer engagement, satisfaction and churn construct basis on the attributes which were collected from the primary data collection procedure from the mobile users, in the near future the study can be concluded on these constructs with the attributes available in secondary data like average revenue per user, complaints, data usage, voice usage etc and can be done with the cluster analysis like operator wise analysis.

In order to conduct the current study AMOS software has been used, in the near future applications like SMART-PLS can be considered for data analysis.

This study was limited to the prepaid telecom industry, a similar kind of study can be extended to other service industries like DTH, broadband etc. and also can be studied for the post-paid or enterprise segment of customers.

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APPENDICES

1. QUESTIONNAIRE

Dear Respondent,

We are researching at Lovely Professional University, Jalandhar, on the topic “Customer Engagement, Satisfaction and Churn: A Study of Indian Telecom Sector”.

Your cooperation is deeply solicited to provide the relevant information for the below questionnaire related your primary or preferred mobile number. Information provided by you will be confidential. •Please fill in all the questions.

Your Name: Mobile Number.....Gender: Male Female

Address:StateTown / City.....

Kindly specify your association with your current service provider on the given parameters as per the scale given below

Rating	7	6	5	4	3	2	1
Description	Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree

Sr. No	Statements	Response							
		7	6	5	4	3	2	1	
1	I frequently call customer care (call centre) for my inquiries.	7	6	5	4	3	2	1	
2	I regularly visit the multibrand outlet (selling products of all mobile service providers) for the resolution of my issues with my service provider.	7	6	5	4	3	2	1	
3	I regularly visit a retailer for the resolution of my problems.	7	6	5	4	3	2	1	
4	I regularly connect with written letter mode with my service provider.	7	6	5	4	3	2	1	
5	I regularly visit the franchisee store for exclusive service.	7	6	5	4	3	2	1	
6	I interact with exclusive company store outlets for my all network and offer related issues.	7	6	5	4	3	2	1	
7	I regularly use call back service for my service queries.	7	6	5	4	3	2	1	

8	I regularly use a service provider mobile app for issues with my service provider.	7	6	5	4	3	2	1
9	I regularly use WhatsApp communication for my issue resolution with my service provider.	7	6	5	4	3	2	1
10	I use SMS service to search best offers or services.	7	6	5	4	3	2	1
11	I regularly use web chat for my queries with my mobile service provider.	7	6	5	4	3	2	1
12	I use USSD (*123#, *199#, etc.) to know the best offers.	7	6	5	4	3	2	1
13	I regularly write emails for my issues to the mobile service providers.	7	6	5	4	3	2	1
14	I use the interactive voice response (IVR) e.g., 1991 service for my best offers.	7	6	5	4	3	2	1
15	I use the company website of the service provider for various mobile services (recharge, offer, activation/deactivation of services).	7	6	5	4	3	2	1
16	I regularly use a third party (Paytm, Phone pay etc.) mobile app for recharge purposes.	7	6	5	4	3	2	1
17	I regularly connect with the chatbot (automated machine-based chat) for my queries about my mobile number.	7	6	5	4	3	2	1
18	I frequently use the service provider's social media (e.g., Facebook, YouTube, LinkedIn etc.) platform for offers/schemes.	7	6	5	4	3	2	1

The following statements relate to customer satisfaction behaviour. Kindly indicate your degree of agreement with the following statements as per the key given below.

Rating	7	6	5	4	3	2	1
Description	Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree

Sr. no.	Statements	Response						
		7	6	5	4	3	2	1
1	I feel satisfied with the OTT (Over the TOP e.g., ZEE5, Netflix, Amazon prime etc.) benefits given by the service provider frequently.	7	6	5	4	3	2	1
2	I feel that my service provider communicates promotional offers.	7	6	5	4	3	2	1
3	I feel that the tariff plans offered by my service operator are	7	6	5	4	3	2	1

	economical.							
4	I feel that my service provider has a wide variety of tariff plans to satisfy a different set of consumers.	7	6	5	4	3	2	1
5	I feel that the tariff plans offered by my service operator provide value for money.	7	6	5	4	3	2	1
6	My service provider gives enough options for value-added services (e.g., caller tune, missed call alerts etc.).	7	6	5	4	3	2	1
7	I feel happy with the surprise gift on various occasion from my service provider.	7	6	5	4	3	2	1
8	My service provider fulfils all its promises.	7	6	5	4	3	2	1
9	My service provider does enough engagement activities (e.g., service camps, customer education programmes etc.) at service centres.	7	6	5	4	3	2	1
10	My service provider is sincere to solve customer issues.	7	6	5	4	3	2	1
11	I get a prompt response from the customer service agent of my service provider.	7	6	5	4	3	2	1
12	My complaint or request is getting resolved in the first time by the service provider.	7	6	5	4	3	2	1
13	My service provider's billing methods are transparent and simple.	7	6	5	4	3	2	1
14	I feel satisfied with the services of my service provider.	7	6	5	4	3	2	1
15	I feel good using my mobile network provider.	7	6	5	4	3	2	1
16	The service provider always meets my needs and I am happy with my provider	7	6	5	4	3	2	1
17	I have to switch places/walk to get clearer reception of the network.	7	6	5	4	3	2	1
18	Many times, my conversation is getting disconnected because of a call drop.	7	6	5	4	3	2	1
19	I can watch HD movies on my mobile without video buffering during travelling.	7	6	5	4	3	2	1

20	I can play seamless online games on my mobile.	7	6	5	4	3	2	1
21	I like to see web series on mobile during my travel.	7	6	5	4	3	2	1
22	I get seamless data coverage during roaming.	7	6	5	4	3	2	1
23	My present services have voice clarity and clear signal.	7	6	5	4	3	2	1
24	I sometimes have to dial twice or thrice to complete a call.	7	6	5	4	3	2	1
25	I rarely get the message “network busy” after dialing a number.	7	6	5	4	3	2	1
26	I regularly use SMS services for my communication without any issue.	7	6	5	4	3	2	1
27	My service provider provides the latest technology services to customers.	7	6	5	4	3	2	1
28	My service provider regularly communicates about new product information to customers.	7	6	5	4	3	2	1
29	The documentation process at the store for my last transaction was hassle-free.	7	6	5	4	3	2	1
30	I have rarely lodged a complaint or called customer care.	7	6	5	4	3	2	1
31	The customer service agent of my service provider is attentive to the problem.	7	6	5	4	3	2	1
32	My service provider is always willing to help.	7	6	5	4	3	2	1
33	My service provider conveys service working hours to customers.	7	6	5	4	3	2	1
34	My service provider is capable to understand customer problems.	7	6	5	4	3	2	1
35	I feel happy after looking at the neatness and cleanliness of the store.	7	6	5	4	3	2	1
36	I don't have to worry about any security issues while doing a transaction with my service provider.	7	6	5	4	3	2	1
37	My service provider is having the skills and knowledge to resolve customer queries.	7	6	5	4	3	2	1
38	My service provider apologies for the inconvenience caused to customers.	7	6	5	4	3	2	1

The following statements relate to customer churn behaviour (i.e., switching from one operator to another). Kindly indicate your degree of agreement with the following statements as per the key given below.

Rating	7	6	5	4	3	2	1
Description	Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree

Sr. No	Statements	Response						
		7	6	5	4	3	2	1
1	My corporate plays a significant role while deciding my operator during the MNP process.	7	6	5	4	3	2	1
2	I prefer all the members of my family must use the services of the same mobile service provider.	7	6	5	4	3	2	1
3	My office colleagues play an important role in my choice of service operator.	7	6	5	4	3	2	1
4	My current service provider has the best promotional campaigns (e.g., product advertisement); hence I am using a mobile connection.	7	6	5	4	3	2	1
5	I have been sticking with my current provider because it has the best advertisements.	7	6	5	4	3	2	1
6	My decision to select/switching of my service provider is influenced by the advertising campaign of the service providers.	7	6	5	4	3	2	1
7	I feel as people don't like to retain their number with the service provider which has a complex and inconvenient SIM exchange process.	7	6	5	4	3	2	1
8	I feel as people generally avoid those operators who have a cumbersome documentation process.	7	6	5	4	3	2	1

9	I feel as the complexities in the activation process of value-added services (e.g., caller tune, roaming, data pack etc.) are a major reason for MNP.	7	6	5	4	3	2	1
10	I feel as people generally prefer to go for those operators who offer a vast variety of value-added services. (e.g., caller tune, roaming, data pack etc.).	7	6	5	4	3	2	1
11	I feel as the tariff is a deciding factor for a customer while deciding with regard to the selection/switching of the operator.	7	6	5	4	3	2	1
12	I feel as birthday gifts /surprise benefits may help a firm to reduce customer churn propensity (intensity).	7	6	5	4	3	2	1
13	In my opinion network, data speed and quality impact customer churn.	7	6	5	4	3	2	1
14	I feel as network coverage plays a significant role while deciding/switching service providers.	7	6	5	4	3	2	1
15	I feel as the quality of voice calls plays a significant role while deciding/switching service providers.	7	6	5	4	3	2	1
16	I feel as trust of the public in the brand may influence customer's decisions while deciding/switching service providers.	7	6	5	4	3	2	1
17	I feel as the brand is an important influencing factor for customer churn.	7	6	5	4	3	2	1
18	In my opinion, people look at the quality brand while taking decisions on MNP.	7	6	5	4	3	2	1

Personal information: Please select your preference.

Q 1. Kindly name current mobile service provider:

Reliance Jio Vodafone Idea Ltd (Vi).....Airtel BSNL.....

Q 2. Kindly specify the duration of association with your current service provider?

Less than 3 months 3-6 months....7-12 months ...1-2 years 2-3 years More than 3 years ...

Q 3. How many numbers of SIM you are using at present?

12 3 more than 3

Q 4. Kindly confirm your age bracket from the below options

18-25 26-59 60 & above.....

Q 5. Kindly select your education from the below options

No formal education.....Up to schooling (10th) Graduate..... Postgraduate.....

Q 6. Kindly select your occupation from the below option

Housewife..... Salary Farmer Business..... Other.....

Note: Some part of the analysis written in the thesis was presented in below conference/papers

2. AWARDS

Title of Paper with Author Names	Name of Conference	Published Date	ISSN no/ vol no, issue no	Remark
Structural Equation Modelling (SEM) of Determinants of Customer Engagement, Satisfaction and Churn: A Case of Mobile Service Providers in India	International Conference on Management and Information Systems (ICMIS-21)	2021	ISBN: 978-1-943295-17-3	Outstanding Paper award in the Conference

3. COPYRIGHT

Title of work	Application number	Remark
Measurement of Customer Engagement, Satisfaction and Churn Construct	Diary Number: 612/2022-CO/L	Approved




Extracts
from the Register
of Copyrights

Dated : 08/04/2022



1. Registration Number	: L-114132/2022
2. Name, address and nationality of the applicant	: LOVELY PROFESSIONAL UNIVERSITY, BLOCK 38, DIVISION OF RESEARCH AND DEVELOPMENT LOVELY PROFESSIONAL UNIVERSITY, JALANDHAR DELHI GT ROAD PHAGWARA-144411 INDIAN
3. Nature of the applicant's interest in the copyright of the work	: OWNER
4. Class and description of the work	: LITERARY/ DRAMATIC WORK INDIAN TELECOM SECTOR HAS SEEN DESTRUCTIVE CHANGE IN RECENTLY, AS INDIA IS MOVING TO DIGITAL ECONOMY ROLE OF CUSTOMER ENGAGEMENT, SATISFACTION AND CHURN IS BECOMING MORE CRITICAL.
5. Title of the work	: MEASUREMENT OF CUSTOMER ENGAGEMENT, SATISFACTION AND CHURN CONSTRUCT
6. Language of the work	: ENGLISH
7. Name, address and nationality of the author and if the author is deceased, date of his decease	: UDAY ARUN BHALE, LOVELY PROFESSIONAL UNIVERSITY JALANDHAR DELHI GT ROAD PHAGWARA- 144411 INDIAN DR. HARPREET SINGH BEDI, LOVELY PROFESSIONAL UNIVERSITY JALANDHAR DELHI GT ROAD PHAGWARA- 144411 INDIAN

4. INDUSTRY ASSISTANCE LETTER

From: V, Varsha (APR), Vodafone Idea
Sent: Monday, March 18, 2019 11:10 AM
To: drp@lpu.co.in; Harpreet.15604@lpu.co.in
Cc: Bhale, Uday (APR), Vodafone Idea <Uday.Bhale@vodafoneidea.com>
Subject: Approval for Assistance to Ph.D. Scholar

To,
Lovely Professional University,
Jalandhar.

This is to inform you that, Mr. Uday Bhale, Ph.D. scholar under the allocated guide Dr. Harpreet Singh Bedi, from the University, has been granted the permission to take the assistance from Vodafone Idea Ltd for his research. Company will provide the technical assistance to the scholar along with the support from the senior expert members and findings can be used to enhance the customer experience of the company.

This approval is strictly to be used for research purpose only and given basis on the request of scholar.

Regards,
Varsha V
Vertical Head HR – Talent and Capability

5. INDUSTRY FEEDBACK ON RESEARCH

R, Ratheesh Kumar (KAP), Vodafone Idea <RatheeshKumar.R@vodafoneidea.com>
to me ▾

Mon, Sep 20, 2021, 12:54 PM ☆ ↶ ⋮

Dear Mr Uday Bhale

Found your Research paper very useful with many insights

We are able to find lot of correlation with your findings and implementing the same in our business will help to keep the Subscribers on to the network. Customer engagement has got various large aspects and it is very dynamic in nature, and your study is covering those latest aspects fitting to the current trends.

All the very best and looking forward such engaging inputs from you in coming future.

Best Regards

Ratheesh Kumar.

GM – Service Excellence

Customer Service

Karnataka & APT



Vodafone Idea Limited

(formerly Idea Cellular Limited)

An Aditya Birla Group & Vodafone partnership

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LIST OF PUBLICATIONS

Note: Some part of the analysis written in the thesis was presented in below papers

S.no.	Title of Paper with Author Names	Name of Journal	Published Date	ISSN no/ vol no, issue no	Indexing in Scopus/ Web of Science/UGC-CARE list
1	Changes in Customer Service Approach, Ecosystem and New Trends in Customer Service	International Journal for Research in Engineering Application and Management	Oct 2018	Volume 04-Issue 07, October 2018	UGC
2	A Qualitative Study on Mobile Number Portability-7th Amendment in Indian Telecom	International Journal of Scientific and Technology Research	Feb 2020	Volume 9 - Issue 2, February 2020 Edition	Scopus
3	A Qualitative Study on Service Channels in The Indian Telecom Industry	International Journal of Scientific and Technology Research	Feb 2020	Volume 9 - Issue 2, February 2020 Edition	Scopus
4	A Study on The Impact of Engagement with Service Channels and Factors Affecting Mobile Number Portability	International Journal of Scientific and Technology Research	Mar 2020	Volume 9 - Issue 3, March 2020 Edition	Scopus

5	A Study on Factors Affecting Consumer Churn in The Indian Telecom Industry	Management Dynamics, Jaipuriya, Lucknow	Aug 2021	Volume 20-Issue 2, August 2021	I-Scholar, J-Gate, and Indian Citation Index (ICI)
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LIST OF CONFERENCES ATTENDED

Note: Some part of the analysis written in the thesis was presented in below conference/papers

S.no.	Title of Paper	Name of Conference	Conference Date	ISSN no/ vol no, Issue no
1	A Study on Factors Affecting Customer Churn In The Indian Telecom Industry	3 rd Jaipuriya Institute of Management Conference (JIMC)	17-18 Jul 2020	NA
2	An Exploratory Study of Influencing Factors on Customer Experience in Cellular Industry	Conference proceeding at Lovely Professional University, Punjab	19 Dec 2020	NA
3	A Study on Customer the Customer Experience of Work from Home Mobile Users During COVID19	Eighteenth AIMS International Conference of Management at Jaipuriya Institute of Management	4-6 Mar 2021	NA
4	Structural Equation Modelling (SEM) of Determinants of Customer Engagement, Satisfaction and Churn: A Case of Mobile Service Providers in India	International Conference on Management and Information Systems (ICMIS-21)	25-26 Sep 2021	ISBN: 978-1-943295-17-3

5	Customer Engagement and Satisfaction: A Study on Indian Telecom Market	IBS, Hyderabad	21- 22 Jan 2022	ISBN 978-93-92377-99-0
6	The Study on Customer Engagement and Satisfaction Relationship Uni-Dimension and Multi-Dimensional Approach with Structural Equation Modelling (SEM)	IIM Indore	3-6 June 2022	NA
7	A Study on Customer Engagement and Satisfaction and its Association with Demographics Reference to Indian Telecom Industry	IIM Indore	3-6 June 2022	NA

LIST OF WORKSHOPS ATTENDED

S.no.	Title of Workshop	Date of Workshop	Organizer
1	National Workshop on Statistical Analysis Using SPSS	22-26 Jun 2020	Lovely Professional University, Punjab
2	Nuances Case Writing	17-18 Jul 2020	Jaipuriya Institute of Management, Indore
3	Publishing in High Impact Journal by Dr Subhadip Roy (IIM, Ahmedabad)	17-18 Jul 2020	Jaipuriya Institute of Management, Indore
4	5G- Architecture, Use Cases & Govt. Initiatives	21 st Aug 2020	Telecom Regulatory Authority of India (TRAI), Hyderabad
5	The Complete Guide to Doctoral Research and Thesis Writing	27 Feb 2021	Research Graduate
6	Plagiarism, Citation And Proof Reading	13 Aug 2022	Research Graduate

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