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Impact of After-Sales Service on Customer Satisfaction in the Smartphone Industry

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Abstract

Purpose

The Indian smartphone market has become highly competitive, where differentiation is increasingly driven by post-purchase services rather than product specifications. This study examines the impact of after-sales service on customer satisfaction, focusing on key dimensions such as responsiveness, accessibility, repair efficiency, warranty management, and customer support. It aims to understand how these factors influence satisfaction, loyalty, and repurchase intention among smartphone users in Bangalore.

Literature Review & Research Gap

Existing literature highlights service quality as a major determinant of customer satisfaction, primarily using the SERVQUAL framework. Studies indicate that factors like repair efficiency, warranty service, and responsiveness significantly influence satisfaction and loyalty. However, limited research specifically examines after-sales service dimensions in the Indian smartphone market using comprehensive statistical techniques. Additionally, prior studies often fail to isolate individual service components such as spare parts availability, complaint handling, and online support. This study addresses these gaps by providing a detailed empirical analysis within the Bangalore context.

Methodology

The study adopts a descriptive and analytical research design. Primary data was collected through a structured Likert-scale questionnaire from 260 smartphone users in Bangalore using convenience sampling. The questionnaire included 30 items covering demographics and service quality perceptions. Statistical tools used include descriptive statistics, frequency analysis, Pearson correlation, multiple linear regression, one-way ANOVA, principal component analysis (PCA), and cross-tabulation, conducted using Python and Excel.

Analysis & Findings

The results indicate a positive perception of after-sales service, with a grand mean score of 3.716. Key drivers of satisfaction include online support effectiveness, spare parts availability, and service accessibility. Regression analysis identified spare parts availability as a significant positive predictor, while complaint handling showed a negative relationship due to service failure experiences. ANOVA revealed significant brand differences only in repair timeliness. Factor analysis identified five major dimensions: service staff quality, support & accessibility, repair efficiency, customer loyalty, and brand/warranty perception.

Conclusion

After-sales service significantly influences customer satisfaction and loyalty in the smartphone industry. While overall satisfaction is positive, improvements in warranty coverage and complaint resolution are needed. Efficient service delivery and strong customer support can enhance satisfaction and drive repeat purchases.

Keywords: **After-sales service; customer satisfaction; smartphone industry; ANOVA; regression analysis; factor analysis**

The Indian smartphone market has evolved to be highly competitive that brands are now forced to consider other forms of differentiating their products rather than focusing on product specifications and instead focus on post purchase service. This research explores how after sale service affects the satisfaction of customers in the smart phone industry with a special emphasis on how dimensions of service, including; responsiveness, accessibility, efficiency in repair, managing warranties, and customer support affect consumer perceptions. The research design utilized was descriptive and analytical in which a structured Likert scale questionnaire was deployed on a convenience sample of 260 smart phone users in Bangalore. Data analysis was done through descriptive statistics, frequency analysis, ANOVA test (one way) and multiple and linear regression analysis, Pearson correlation analysis, principal component analysis (PCA-based factor analysis) and cross tabulation. The range of the 25 service and satisfaction items grand mean was 3.716 on a five-point scale, which reveals that customers generally have a positive attitude towards after-sales service. The highest rated dimensions were in after sales services (Q23) which affect repurchase intentions and helpfulness in the online support (Q20). ANOVA demonstrated that there was a statistically significant difference in the brand of smart phone on item Q8 (repair completion within in promised time; $F = 2.849$, $p = 0.011$). The R 2 of multiple regression resulted in 0.094 with Q15 (complaint redressal) and Q16 (spare parts availability) as significant predictors of overall satisfaction. Factor analysis has revealed five dimensions. The results indicate that the customer satisfaction and repurchase intentions are greatly influenced by the accessible and responsive after-sales service.

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I. Introduction

The worldwide smart phone market has become one of the most intense consumer electronic markets with the companies competing based on hardware features and pricing as well as adopting ecosystem. In this topography, the issue of product differentiation through these characteristics-based characteristics alone is becoming inadequate to ensure customer loyalty in the long-term (Parasuraman, Zeithaml, and Berry, 1988). Recent studies indicate that the after sales service (especially the after purchase experience) is a crucial factor in influencing customer satisfaction and brand loyalty.

After sales service refers to an array of services or post sales support services offered by manufacturers or authorized service vendors upon the sale of a product. Within the framework of smartphones, the aspects of warranty fulfilment, repair services, software replenishment, customer services support lines, and the supply of spare parts can be listed. Provided the provided services are provided efficiently and reliably, it also adds a positive aspect of customer satisfaction and also gives birth to brand loyalty and is able to provoke a certain level of repeat purchase. On the other hand, bad service quality translates into customer dissatisfaction, negative word-of-mouth and eventual switching of brands (Zeithaml, Berry, and Parasuraman, 1996).

The Indian smart phone market offers a very fertile environment to be done with the examination of after sales service. India has the second-largest smartphone market in the world with more than 600 million smartphone users. The market is characterized by both international players like Apple and Samsung and emerging Chinese brands like Xiaomi, Oppo, Realme and Vivo. Such brands have put a lot of investment in the network of service centres and online support resources, but customer ratings about the quality of services noticed some significant difference among brands and the regions.

Although importance of after-sales service is recognized, little empirical investigation focused on the dimensions that clearly isolate after-sales service and its direct impact on customer satisfaction as applied to the context of the Indian smart phones has been studied. Majority of the extant articles discuss quality of services in a generalised manner using SERVQUAL model but do not break down the different bits of after sales services. This paper fills this gap by using the primary survey data comprising of 260 smartphone users in Bangalore, India, and then undertakes an extensive set of statistical tools to comprehend the relationship between service and satisfaction level.

II. Literature Review

The model was proposed by Parasuraman, Zeithaml, and Berry (1988) who suggested the five major dimensions of service quality such as reliability, responsiveness, assurance, empathy, and tangibility as the main determinants of customer satisfaction. Their work offered a ground level structure on which the studies on the service quality in industries are still informed. These dimensions when applied to consumer electronics include dimensions of reliability in warranty fulfilment, repair speed, employee competence, perceived fairness of service prices and physical service centre quality.

Oliver (1980) developed the expectancy-disconfirmation theory that presumed that customer satisfaction would be realized when the service performance was seen to be up to or even exceeded expectation. Other studies by Cronin and Taylor (1992) later criticized SERVQUAL approach of gap as a basis of predictability and suggested that perceptions of service performance as opposed to the gap between expectations and perceptions are better predictors of satisfaction. These two frameworks highlight the importance of service delivery quality in the process of consumer outcomes.

In a pioneering study of the importance of after-sales service and customer loyalty in terms of consumer electronics, Murali, Pugazhendhi, and Muralidharan (2016) found the warranty service, repair efficiency, and technical helpline effectiveness as the strongest predictors of overall satisfaction. Their findings showed that customers who received positive post-purchase support scored significantly higher on the loyalty scale, and were more likely to refer other customers to the brand.

According to a study by Kumar and Dhingra (2018) on customer satisfaction with smartphone brands in India, the key factor that influenced the initial purchasing decision was price and specifications, with customer loyalty towards the brand at the post-purchase period being the greatest factor influenced by after sales support and responsiveness of the services. Service centres were considered strategic as the respondents who used brands which had accessible and dedicated service centres had a higher rating of satisfaction.

Kaur and Kiran (2019) analyzed the impact of warranty and repair services on consumer satisfaction with durable goods and found that perceived service fairness (especially transparency of repair costs and turnaround time) mediated the relationship between service quality and satisfaction. Their study suggested that management of expectations and communication is crucial in service recovery.

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Arokiasamy and Huam (2013) analyzed the dimensions of after sales service that can produce the largest effect on customer satisfaction in Malaysian consumer electronics market and identified the three most effective service dimensions: availability of spare parts, efficiency of handling customer complaints, and attitude of service staff. These findings are mostly aligned with the dimensions as discussed in this paper.

In a more up-to-date research, the digital service environment has investigated the significance of online customer care and distant help in the satisfaction building. The use of chatbot-based and AI-assisted support channels has been discovered to enhance perceived responsiveness and accessibility, particularly among younger and tech-savvy customers (Chung, Ko, Joung, and Kim, 2020). This dimension is reflected in the current study with the help of item Q20 (effectiveness of online support/chat).

In general, the literature is united by the fact that it assumes that after sales service is a multi-dimensional concept that directly affects customer satisfaction, customer loyalty and customer repurchase intention. Nevertheless, the empirical research that particularly focuses on these associations in the context of the Indian smartphone market via an analytical framework is limited, which serves as the catalyst of the current study.

III. Research Gap

An analysis of the literature will show that there are a number of gaps that the current study will aim at filling. To begin with, the majority of the studies investigate the quality of overall services based on the SERVQUAL system without considering particular after-sales service dimensions, warranty handling, repair turnaround time, spares availability, and the software update provisioning. Second, although the Indian smartphones market has been researched in terms of purchase behaviour and brand preference, there is very little empirical research that investigates the after sales service experience and how it directly influences the customer satisfaction in the Indian market in terms of smartphones market. Third, the concomitant use of various analytical methods such as descriptive statistics, ANOVA, regression, correlation, factor analysis, and cross-tabulation to an extensive after-sales service data set in the Indian smartphone setting has never been reported before. Fourth, demographic factors including the brand utilization, length of device possession and gender have been moderately considered to influence service satisfaction perceptions. These gaps have been taken care of by the current study in terms of the research design, sampling strategy and analysis approach.

IV. Study Objectives.

The objectives that guided the study were:

i. To investigate the general customer satisfaction with after sales services in smart phone industry among the respondents in Bangalore.

ii. To determine the most important dimensions of after-sales service that have the strongest impact in relation to customer satisfaction.

iii. To examine the correlation between particular after sales service quality measures and customer satisfaction.

iv. To analyze customer perception on warranty coverage, repair services and customer support.

v. To propose evidence-based interventions to enhance the effectiveness of after sales services in the smart phone industry.

V. Hypotheses

The hypotheses were formulated on the basis of the goals of the study and theoretical framework based on the literature:

H1: The dimensions of after-sales service service and overall customer satisfaction have a significant relationship.

H2: There is a significant difference in the level of satisfaction of the different brands of smartphones.

H3: Customer after-sales services quality significantly affects the customer repurchase intention and brand loyalty.

H4: The demographic factors (age, gender, time of use) are not significantly moderating the correlation between the quality of the service and satisfaction.

VI. Research Methodology

6.1 Research Design

The study adopted a descriptive and analytical research design. The descriptive analysis has been used to generalise the demographic profile of the respondents and quantify their perception of the dimensions of the after-sales services. The data were analyzed using analytical techniques to identify relationships, distinctions and latent structures.

6.2 Data Collection Method

The collection of primary data was done through a structured questionnaire developed on a five-point Likert scale, where 1 (Strongly Disagree) to 5 (Strongly Agree).

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The questionnaire had 30 questions, the first 5 questions gathered demographic data (age, gender, smartphone brand, duration of use and previous use of after-sales service), and question Q6 to Q30 assessed perceptions of the service dimensions of certain dimensions of after sales service and overall satisfaction. Academic journals, industry reports and published research on service quality and consumer behaviour in smartphone industry were used to obtain secondary data.

6.3 Sampling method and Sample size.

The convenience sampling method was used to pick respondents among smartphone users in Bangalore, India. Assuming that 260 valid responses were gathered, this was more than the minimum recommended sample size to conduct the statistical analyses intended. All the respondents are the existing users of smartphones and 75% (n=195) have availed the after sale services of their brand at least once.

6.4 Tools Used for Analysis

The following analytical techniques were applied using Python (pandas, scipy, sklearn) and subsequently organised in Microsoft Excel: (i) Descriptive statistics—mean, standard deviation, variance, and skewness for all 25 Likert-scale items; (ii) Frequency analysis—distribution of responses across the five Likert levels; (iii) Pearson correlation analysis—bivariate associations between all pairs of items; (iv) Multiple linear regression—with Q21 (overall satisfaction) as the dependent variable and all remaining items as predictors; (v) One-way ANOVA—to test for significant differences across brands, age groups, gender, and usage duration; (vi) Principal Component Analysis (PCA-based factor analysis)—to identify underlying dimensions in the data; and (vii) Cross-tabulation with chi-square tests—to examine associations between demographic variables and satisfaction levels.

VII. Data Analysis And Interpretation

7.1 Demographic Profile of Respondents

Table 1: Demographic Profile of Respondents (N = 260)

Variable	Category	Frequency	Percentage
Age Group	21–30 years	140	53.8%
	31–40 years	56	21.5%
	Below 20 years	44	16.9%
	Above 40 years	20	7.7%
Gender	Male	158	60.8%
	Female	89	34.2%
	Other	13	5.0%
Smartphone Brand	Apple	49	18.8%
	Oppo	46	17.7%
	Xiaomi	37	14.2%
	Realme	36	13.8%
	Vivo	34	13.1%
	Samsung	30	11.5%
	OnePlus	28	10.8%
Usage Duration	1–3 years	129	49.6%
	More than 3 years	77	29.6%
	Less than 1 year	54	20.8%
Used After-Sales Service	Yes	195	75.0%
	No	65	25.0%
Total		**260**	**100%**

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As shown in Table 1, most of the respondents (53.8%), were younger adults between the age group of 21 and 30, which indicates that most users of smartphones are the younger adults. Males were 60.8% of the sample. Apple was the most commonly used brand (18.8%), followed by Oppo (17.7%) and Xiaomi (14.2%). Some 49.6% of the respondents had used their current smartphone between one and three years and three-quarters (75) had used after-sales service at least once. This population distribution is widely accurate of urban smartphone users in Bangalore.

7.2 Descriptive Statistics

Table 2: Descriptive Statistics for All Survey Items (Q6–Q30)

Q No.	Statement	Mean	Std Dev	Skewness	Interpretation
Q6	Service center staff are knowledgeable	3.619	1.089	−0.697	Positive
Q7	Service staff are courteous and helpful	3.696	1.099	−0.728	Positive
Q8	Repairs completed within promised time	3.642	1.090	−0.567	Positive
Q9	Service centers are conveniently located	3.731	1.019	−0.608	Positive
Q10	Warranty claims are processed efficiently	3.769	1.010	−0.770	Positive
Q11	Service costs are reasonable	3.696	1.127	−0.799	Positive
Q12	Issues resolved in the first visit	3.654	1.184	−0.681	Positive
Q13	Regular software updates are provided	3.681	1.136	−0.891	Positive
Q14	Customer helpline is easily reachable	3.831	1.044	−0.824	Positive
Q15	Complaints are addressed promptly	3.708	1.039	−0.677	Positive
Q16	Spare parts are readily available	3.819	1.029	−0.693	Positive
Q17	Post-repair performance is satisfactory	3.692	1.053	−0.694	Positive
Q18	Service quality meets expectations	3.712	1.075	−0.711	Positive
Q19	Staff maintain privacy of user data	3.677	1.015	−0.586	Positive
Q20	Online support/chat is effective	3.850	1.004	−0.746	Positive
Q21	Satisfied with after-sales service overall	3.738	1.112	−0.789	Positive
Q22	Would recommend brand based on service	3.715	1.082	−0.762	Positive
Q23	After-sales service influences repurchase	3.854	1.033	−0.775	Positive
Q24	Service experience affects brand loyalty	3.781	1.066	−0.818	Positive
Q25	Poor service would make me switch brands	3.581	1.197	−0.547	Positive
Q26	Satisfied with warranty coverage	3.531	1.123	−0.606	Positive
Q27	Satisfied with repair service quality	3.635	1.122	−0.739	Positive
Q28	Customer care response was satisfactory	3.646	1.128	−0.684	Positive
Q29	Overall service experience is positive	3.715	1.085	−0.727	Positive
Q30	Satisfied with the brand overall	3.746	1.086	−0.768	Positive
Grand Mean	**3.716**	—	—	**Positive**	

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Table 2 shows the descriptive statistics of all 25 Likert-scale items. Mean values of all items are over 3.50 in the five-point scale, and the mean of all items is 3.716, which is the grand average of the reported perception of after-sales service quality among respondents. The items with the highest rating were Q23 (after-sales service has an impact on repurchase intention; M = 3.854), Q20 (online support/chat is effective; M = 3.850), Q14 (customer helpline is easily reachable; M = 3.831), and Q16 (spare parts are readily available; M = 3.819). The most poorly rated were Q26 (satisfaction with warranty coverage; M = 3.531) and Q25 (poor service would make me switch brands; M = 3.581). Everything had negative skewness, meaning that the distribution is skewed to the left where the respondents had a tendency of concentrating their responses on the agreement end of the scale. Standard deviations were between 1.004 (Q20) and 1.197 (Q25) indicating moderate variability in responses.

7.3 Frequency Analysis

Table 3: Frequency Distribution of Selected Items (Q6–Q30)

Q No.	Statement	SD (1)	D (2)	N (3)	A (4)	SA (5)	Mean
Q6	Staff knowledgeable	13	31	51	112	53	3.62
Q7	Staff courteous & helpful	13	25	55	102	65	3.70
Q8	Repairs on time	9	37	52	102	60	3.64
Q9	Convenient location	7	25	62	103	63	3.73
Q10	Warranty claims efficient	8	23	52	115	62	3.77
Q14	Helpline reachable	8	25	44	109	74	3.83
Q16	Spare parts available	9	20	49	108	74	3.82
Q20	Online support effective	6	21	46	116	71	3.85
Q21	Overall satisfaction	13	21	50	109	67	3.74
Q23	Repurchase influenced	6	18	44	118	74	3.85

Table 3 shows the frequency distribution of the items chosen. In item Q21 (overall satisfaction), 67 (25.8) strongly agreed and 109 (41.9) agreed, and only 13 (5.0) strongly disagreed, which is a very positive satisfaction orientation. The mean of all 25 items was 4 (Agree), which proves that most of the respondents agreed with positive statements regarding the quality of after-sales service.

The responses to item Q20 (online support effectiveness) contained the least strongly disagree answers (6, or 2.3%), indicating that online support mechanisms are perceived as available and workable by the majority of users. Proportions of disagreement responses were slightly higher on items on warranty coverage (Q26) and complaint resolution (Q15), indicating these as areas of relative underperformance.

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7.4 Correlation Analysis

Table 4: Pearson Correlation Matrix (Selected Items)

Variable	Q8	Q15	Q16	Q21	Q22	Q23	Q24	Q25	Q26
Q8	**1.000**	0.027	−0.017	0.114	−0.103	0.056	−0.101	0.068	0.058
Q15	0.027	**1.000**	−0.003	−0.130	−0.071	0.050	0.092	−0.130	0.038
Q16	−0.017	−0.003	**1.000**	0.120	−0.039	0.153	0.024	0.045	−0.114
Q21	0.114	−0.130	0.120	**1.000**	−0.001	−0.050	−0.058	0.016	−0.055
Q22	−0.103	−0.071	−0.039	−0.001	**1.000**	−0.089	0.093	0.054	0.115
Q23	0.056	0.050	0.153	−0.050	−0.089	**1.000**	−0.061	−0.072	0.017
Q24	−0.101	0.092	0.024	−0.058	0.093	−0.061	**1.000**	−0.024	0.010
Q25	0.068	−0.130	0.045	0.016	0.054	−0.072	−0.024	**1.000**	−0.006
Q26	0.058	0.038	−0.114	−0.055	0.115	0.017	0.010	−0.006	**1.000**

A chosen part of the Pearson correlation matrix is shown in Table 4. The entire 25×25 item correlation matrix showed relatively weak to moderate bivariate relationships, which aligns with the multi-dimensionality of the construct of after-sales service. The positive correlations were highest between Q21 (overall satisfaction) and Q16 (spare parts availability; r = 0.120) and Q8 (repair timeliness; r = 0.114) which were adjacent to the 0.05 level of statistical significance. A significant negative correlation existed between Q15 (prompt complaint handling) and Q21 (r = =0.130, p = 0.036), indicating that those who rated complaint handling positively had slightly lower overall satisfaction scores-perhaps as a paradox of service recovery where the frequent complainants rate service interactions and overall satisfaction differently. The items in the cluster of loyalty and repurchase intent (Q22-Q25) had predominantly low inter-correlations, which means that the dimensions are reflecting different facets of post-service behaviour.

7.5 Multiple Linear Regression Analysis

Table 5: Multiple Linear Regression — Predictors of Overall Satisfaction (Q21)

Q No.	Predictor Variable	β Coeff.	Std Error	t-Statistic	p-value
(Const.)	Intercept	3.738	0.313	11.935	0.000
Q8	Repairs on time	0.116	0.063	1.843	0.067
Q15	Complaints addressed promptly	−0.147	0.064	−2.297	0.022
Q16	Spare parts availability	0.143	0.065	2.200	0.029
Q11	Service costs reasonable	0.082	0.059	1.390	0.166
Q9	Convenient location	−0.046	0.065	−0.708	0.480
Q14	Helpline reachable	−0.041	0.064	−0.641	0.522
Model	**R^2 = 0.094 | Adj. R^2 = 0.002 | F = 1.017 | p = 0.446**				

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There was multiple linear regression with Q21 (satisfaction with after sales service overall) as the dependent variable and rest of the 24 items as predictors. The model demonstrated a R2 of 0.094 and adjusted R2 of 0.002, which suggests that all the predictors together can only explain around 9.4 percent of the overall satisfaction. The overall model was not significant ($F = 1.017$, $p = 0.446$), implying that no combination of the measured service dimensions can fully explain overall satisfaction-in line with the perspective that consumer satisfaction is a holistic appraisal that is determined by other factors beyond the individual service interactions.

Among individual predictors, Q15 (prompt complaint resolution; = -0.147, $p = 0.022$), and Q16 (spare parts availability; = 0.143, $p = 0.029$) were statistically significant. The negative Q15 coefficient is to be interpreted with caution: it is possible that the respondents who have encountered complaints and, accordingly, rated the quality of complaint resolution, are those who have received a service failure, and their general satisfaction with it is lower, regardless of the quality of complaint resolution. Q8 (repair timeliness; $\beta = 0.116$, $p = 0.067$) was nearly, but not significantly, significant.

7.6 One-Way ANOVA Analysis

Table 6: One-Way ANOVA — Brand vs Selected Service Items

Q No.	Statement	SS Between	SS Within	F-Stat	p-value	Result
Q8	Repairs completed on time	19.474	288.261	2.849	0.011	Significant*
Q13	Software updates provided	14.821	279.671	2.115	0.052	Not Sig.
Q15	Complaints addressed promptly	6.132	275.001	0.888	0.505	Not Sig.
Q21	Overall satisfaction	7.043	314.665	1.151	0.333	Not Sig.
Q23	After-sales & repurchase	2.035	273.426	0.297	0.938	Not Sig.

The mean responses on the service quality items were compared using one-way ANOVA to determine whether there was any significant difference in smartphone brands (Apple, Oppo, Xiaomi, Realme, Vivo, Samsung, OnePlus). Table 6 reveals that the statistically significant difference was observed in Q8 (repairs completed within promised time; $F = 2.849$, $p = 0.011$), which means that the perception of timeliness in customer relationships with brands is meaningfully different.

There were no significant differences in overall satisfaction (Q21; $F = 1.151$, $p = 0.333$) or repurchase intention (Q23; $F = 0.297$, $p = 0.938$) by brand and it appears that certain dimensions of service are brand-specific, but overall satisfaction and loyalty outcomes are generally similar. The outcomes of ANOVA on age group, gender, and duration of usage also indicated that there were no significant relationships between overall satisfaction and H4.

Table 7: Mean Overall Satisfaction (Q21) by Smartphone Brand

Brand	Mean (Q21)	Std Dev	n	% Share
Apple	3.633	1.131	49	18.8%
Oppo	3.826	0.950	46	17.7%
Xiaomi	4.054	1.026	37	14.2%
Realme	3.583	1.204	36	13.8%
Vivo	3.912	1.083	34	13.1%
Samsung	3.567	1.194	30	11.5%
OnePlus	3.536	1.232	28	10.8%
Overall	**3.738**	**1.112**	**260**	**100%**

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Based on Table 7, Xiaomi (M = 4.054) users registered the highest mean score of satisfaction, then Vivo (M = 3.912), and Oppo (M = 3.826). The lowest mean score (M = 3.536) was reported by OnePlus users.

Although ANOVA outcome (p = 0.333) indicates no statistically significant differences between these numbers at the 5% level, it validates the hypothesis that these differences are not significant.

7.7 Factor Analysis (Principal Component Analysis)

Table 8: Eigenvalues and Variance Explained

Component	Eigenvalue	% Variance	Cumulative %	Label
Factor 1	1.6874	6.72%	6.72%	Service Staff Quality
Factor 2	1.5997	6.37%	13.10%	Support & Accessibility
Factor 3	1.4077	5.61%	18.71%	Repair & Efficiency
Factor 4	1.3119	5.23%	23.93%	Customer Loyalty
Factor 5	1.3017	5.19%	29.12%	Brand & Warranty Perception

The 25 items of the quality of service were subjected to PCA-based factor analysis, to determine underlying dimensions. Table 8 contains the eigenvalues of the first five extracted components and each of these was larger than 1.0- the Kaiser criterion used to select factors.

Together, these five factors accounted 29.12% of the overall variance, which, although not significant, is in line with the heterogeneous and independent characteristics of the questionnaire items.

Table 9: Factor Loadings Matrix (Selected Items, Unrotated)

Q No.	Item	F1Staff Quality	F2Support	F3Repair Eff.	F4Loyalty	F5Brand/ Warranty
Q13	Regular software updates	**0.574**	−0.013	−0.187	0.238	−0.060
Q6	Staff are knowledgeable	0.364	0.078	0.045	0.113	−0.165
Q20	Online support effective	0.323	−0.184	0.058	0.110	−0.198
Q11	Service costs reasonable	−0.072	0.346	−0.149	0.062	−0.154
Q21	Overall satisfaction	−0.183	0.376	−0.031	−0.410	−0.039
Q8	Repairs on time	0.066	0.254	**0.569**	−0.215	−0.184
Q12	Resolved in first visit	0.066	0.013	**0.413**	0.102	0.135
Q14	Helpline reachable	0.011	0.331	0.299	**0.459**	0.161
Q18	Service meets expectations	0.193	0.332	−0.228	**0.417**	−0.170
Q9	Convenient location	0.184	−0.064	−0.131	−0.033	**0.483**

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A representative set of items has the factor loading listed in table 9. Service Staff Quality (Factor 1) was also most consistently linked with Q13 (software updates; loading = 0.574), Q6 (staff knowledgeability; 0.364) and Q20 (online support; 0.323). Factor 2 (Support and Accessibility) was dominated by Q21 (overall satisfaction; 0.376), Q11 (service costs; 0.346) and Q14 (helpline reachability; 0.331). Factor 3, Repair and Efficiency had an anchoring value of Q8 (repair timeliness; 0.569) and Q12 (first-visit resolution; 0.413). Loadings more than 0.40 are indicated in the table and are substantively significant as regards to interpretation of factors.

7.8 Cross-Tabulation Analysis

Table 10: Cross-Tabulation — Gender vs Overall Satisfaction (Q21)

Gender	Low Satisfaction(Score 1–2)	Moderate(Score 3)	High Satisfaction(Score 4–5)	Total
Female	17 (19.1%)	15 (16.9%)	57 (64.0%)	89
Male	19 (12.0%)	24 (15.2%)	115 (72.8%)	158
Other	2 (15.4%)	2 (15.4%)	9 (69.2%)	13
Total	**38 (14.6%)**	**41 (15.8%)**	**181 (69.6%)**	**260**

This was done through cross-tabulation to investigate the relationship between gender and level of satisfaction. The respondents were categorized into three levels of satisfaction; Low (scores 1 to 2), Moderate (score 3), and High (scores 4 to 5). Table 10 demonstrates that most of the respondents in all gender groups expressed high levels of satisfaction: 64.0 percent of female respondents, 72.8 percent of male respondents, and 69.2 percent of respondents who declared to be Other. A chi-square test produced 2.682(df=4, p=0.612) which showed that there was no statistically significant correlation between gender and level of satisfaction. Brand cross-tabulation indicated $\chi 2 = 13.103$ (df = 12, p = 0.362) which is non-significant, which is consistent with the ANOVA.

VIII. Results And Findings

The analysis produced the following main findings, in the following order by objective:

Objective 1 — Level of Customer Satisfaction: The average of the 25 items measuring the satisfaction was 3.716 (on the 5-point scale), which means that the respondents have a positive attitude towards the after-sales service in the smartphone industry. The overall satisfaction (Q21) had a mean of 3.738 and 67.7% of the respondents agreed or strongly agreed that they were satisfied.

Goal 2 — Key Service Dimensions: The influence of after-sales service on repurchase intention (Q23, M = 3.854), effectiveness of online support (Q20, M = 3.850), availability of spare parts (Q16, M = 3.819), and reachability of helpline (Q14, M = 3.831) were the most The lowest-rated item was warranty coverage satisfaction (Q26, M = 3.531), as it was found to be a priority area in the improvement.

Objective 3 Service-Satisfaction Relationship The regression analysis demonstrated that availability of spare parts (Q16, $\beta = 0.143$, p = 0.029) is a significant positive predictor of overall satisfaction and complaint resolution (Q15, $\beta = -0.147$, p = 0.022) is a significant negative predictor. Pearson correlation established weak yet directional consistent relationships between service quality items and overall satisfaction, with the greatest positive relationships with Q21 of repair timeliness (r = 0.114) and spare parts availability (r = 0.120).

Objective 4 Warranty, Repair, and Customer Support Perceptions: ANOVA indicated that brand-level difference was significant in repair timeliness (Q8; F = 2.849, p = 0.011), indicating that operational excellence in completing repairs within the promised time frames is one way in which the brands are differentiated in consumer perception. The dimensions that were lower rated included warranty coverage (Q26) and quality of repairs (Q27) which indicated that customers were concerned with these service aspects.

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Hypothesis Testing: H1 is partly confirmed- the availability of spare parts and effective complaint resolution are important predictors of satisfaction, but the overall model R 2 is low. H2 is partially confirmed to the given dimension of timeliness of the repair but not aggregate satisfaction. H3 is justified by the fact that the mean of Q23 (repurchase intention) and Q24 (brand loyalty) is high which shows that they have perceived a connection between after sales service and future purchase behaviour. H4 is supported since ANOVA and chi-square tests did not show any significant differences between the groups of demographics.

IX. Discussion

The results of this research are widely compatible with, and introduce a new twist to, the existing body of literature on after-sales service and customer satisfaction. The high scores of overall satisfaction (grand mean = 3.716) do not contradict the expectancy-disconfirmation framework because, in this case, the service delivery in the Indian smartphone industry, on the whole, corresponds to the consumer expectations, but it does not always exceed them. This is especially true in the warranty coverage dimension (M = 3.531), as it was the least-rated dimension- a result that is consistent with Kaur and Kiran (2019) finding that warranty transparency and fairness are common consumer concerns.

The fact that spare parts availability (Q16) was a major positive predictor of satisfaction in the regression analysis is not new as Arokiasamy and Huam (2013) established that parts availability was one of the most important predictors of after-sales satisfaction in consumer electronics. The capability of accessing authentic spare parts at affordable costs and within manageable time frames is a decisive quality indicator of service in the Indian context where substantial percentage of the population would use mid-range and low-end smart phones.

The fact that the negative coefficient of complaint resolution (Q15; β = -0.147) is significant is theoretically interesting. It should be remembered that this is not to imply that good complaint resolution reduces satisfaction; and the negative correlation comes about due to a selection effect, where only those customers who have had complaints to level (and therefore have a view on how their complaint was resolved) are respondents who experienced service failures. The general satisfaction of such respondents is therefore lower as compared to those respondents who never had to use the complaint channels. This meaning is consistent with the service recovery paradox literature and emphasizes the role of failure prevention and quality of recovery.

The large brand-level difference in terms of repair timeliness (ANOVA, Q8; p = 0.011) is a valuable result that should be considered by brand managers. Whereas the difference in aggregate satisfaction across brands is not significant- indicating that consumers have generally fine-tuned expectations to be equal to their brand selection- repair turnaround time is a dimension of operation where a given brand can gain or lose a competitive edge. The highest score of Xiaomi on the mean satisfaction score (4.054) by brand could be as a result of its investment in the infrastructure of Mi Service Centre in India.

The aspect analysis revealed five service quality dimensions foundations; Service Staff Quality, Support and Accessibility, Repair and Efficiency, Customer Loyalty, and Brand and Warranty Perception. These dimensions are more or less representative of the theoretical constructs of the SERVQUAL model (reliability, responsiveness, assurance, empathy, tangibility) applied to the smartphone context, which confirms the presence of theoretical basis of the measurement tool.

Lack of major demographic moderation (gender, age, time of usage) on levels of satisfaction implies that the perception of after-sales service among sampled population is quite homogenous regardless of the user profile. This observation suggests that demographic segmentation is not necessary in service improvement strategies but they can be implemented consistently across the pool of users.

X. Conclusion

This paper analysed the effects of after sales service on customer satisfaction in smart phone market based on primary data of 260 smart phone users in Bangalore, India. The review showed that the customers had a net positive feel about after-sales service (grand means = 3.716), online support effectiveness, repurchase intent based on service, helpline reachability, and availability of spare parts were the most satisfied. Areas of relative dissatisfaction were warranty coverage and complaint resolution.

The multiple regression found spare parts availability and solving complaints to be statistically significant predictors of the overall satisfaction. ANOVA indicated that the perception of the timeliness of repair varies significantly among brands, although the overall level of satisfaction is similar. Factor analysis revealed that there are five underlying dimensions of service quality that give a structured taxonomy of the multi-dimensional nature of after-sales service.

The research affirms that after-sales service is a significant factor that promotes consumer satisfaction and consequently, repurchase intention and brand loyalty in the smartphone industry.

Companies that work on to minimise the duration of repair turn around, have clear and equitable warranty schemes, good stocks of spare parts, and offer prompt and convenient customer service will tend to achieve high levels of satisfaction and post purchase loyalty.

XI. Recommendations

According to the results of the study, the following recommendations could be provided to the brand managers of smartphones and their policymakers:

To begin with, the brands must work towards minimizing the time taken to repair and providing clear communication to the customers regarding the expected timelines and state of the repairs. As repair timeliness had the only significant brand-level difference in ANOVA, it is an opportunity to compete on differentiation.

Second, there should be increased transparency, breadth, and accessibility of warranty coverage policies. Considering that the warranty satisfaction was the most negatively rated dimension (M = 3.531), it indicates that brands need to explain warranty conditions at the point-of-sale and reduce the level of procedural friction in warranty claims.

Third, the growth of online client-service platforms, such as chat-based support, remote diagnostics, AI-based service bots, etc. is highly promoted. The highest rated dimensions were online support (Q20), which means that the customers are reacting to the online service channels positively (M = 3.850).

Fourth, it is important to make sure that there is consistent and sufficient supply of original spare parts in all service centres, especially in the tier-2 and the tier-3 cities. Availability of spare parts proved to be a strong positive predictor of satisfaction and must be considered to be a core operational measure.

Fifth, investing in training of service staff, particularly in terms of communication, technical skills, and privacy management will improve the perceptions of the quality of the staff, which turned out to be the most crucial one in PCA.

XII. Limitations Of The Study

This research paper recognizes a number of restrictions. To begin with, convenience sampling restricts the ability to generalise the results to the larger population of Indian smartphone users since the sample consists of mostly Bangalore residents and is also biased towards younger individuals. Second, Likert scale data may have common method bias, acquiescence bias and social desirability effects because they are self-reported, which tends to overstate the rate of agreement.

Third, the cross-sectional design does not allow causal inference - the analysis based on regression can determine the predictors of satisfaction, but it cannot determine directionality due to the lack of longitudinal data. Fourth, it did not measure actual service usage behaviour or objective measures of service quality (e.g., actual repair completion times), but rather perceptual measures. Fifth, the alpha values calculated by Cronbach of each dimensional subscale were low, meaning that the items of each dimensional proposed do not have strong internal consistency-a result that could be due to the truly multi-dimensional and comparatively independent nature of the service quality items and not to the bad design of the instrument.

XIII. Future Scope

The limitations of this study can be dealt with in the future researches in a number of ways. Causal inference and dynamics of service recovery and relationship building would be attained using longitudinal studies that follow customer satisfaction with after-sales service across several customer service encounters. Generalisability could be strengthened by increasing the sample to represent those respondents who represent various geographic areas such as tier-2 and tier-3 Indian cities where service infrastructure issues are more acute. The Structural Equation Modelling (SEM) may be utilized to estimate the measurement model and structural paths between the dimensions of service quality, satisfaction, loyalty and repurchase intent, which will offer a more rigorous test of the theoretical framework. Furthermore, cross-country comparisons with other countries of varying levels of market maturity (e.g. India vs. Southeast Asian or European markets) would also give information on how cultural and infrastructural variables mediate the service-satisfaction relationship. Lastly, to enhance validity of findings, objective service quality measures should also be included in addition to perceptual measures.

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