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## Innovated Technology in Banking Services

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### **Abstract**

The study focuses on the Innovative services provided by the banks as mobile banking, phone banking, card banking, internet banking and inter-branch banking. The study analyse the satisfaction level, usage period and user rate of account holders while using these innovative banking services. The study also focus on the inter relationship between the groups and with in the groups. The broad objective of the study has, therefore, been to assess and analyze the degree of goodness and satisfaction of innovated banking service among the account holders; to analyze the existing differentials in levels of innovative banking services (phone banking, mobile banking, card banking, and internet banking and inter branch banking) provided by public and the private sector banks; to analyze the various factors considered while choosing the bank.

**Keywords: Internet, banking, banking services, mobile banking**

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## **INTRODUCTION**

This study/Research has been done to identify how Innovative technological solutions are affecting banking services.

India's financial services industry is dominated by the banking sector that contributes significantly to its total revenue. And the backbone of any economy can be best evaluated by the strength and flexibility of its banking structure. Since the banks are increasingly adopting the innovated technology, automatically there arises a gap between financial services and information technology while being diffused. This information gap can be viewed in terms of the extent of awareness and adoption of innovated products and services offered by the bank to their customers/account holders and also the risk involved in their execution. Bridging this kind of gap by bank employees, financial executives and account holders through collection and reporting of the required primary data appears to be the remotest possibility. Moreover, its benefits are likely to percolate only to the account holders but also the marketers, the bank providing products & services, financial institutions, web designers etc. The present study entitled as "Technological change in Banking Services: A Study of Private and public banks." has, therefore, been an attempt to bridge this gap.

The specific hypotheses, which have been examined and analyzed during the course of this study, are:

Significance difference among the several innovated services provided by bank on the basis of goodness.

## **METHODOLOGY AND SOURCES OF DATA**

NCR has been selected as an operational area of this study primarily because it is one of the highly advanced area in respect of all the three key sectors of the economy, i.e. agriculture, industry and service. Secondly, the net work of the banking institution is found to be exceptionally strong and quick maturing.

Further, in order to carry out the comparative analysis of the performance of the innovated banking services, we have given due weight age to both the public and the private sector banks and hence have selected the three SBI, PNB, Allahabad and HDFC, ICICI and AXIS from the latter. The reasons being that both types of banking institutions available in the area are found to have made sincere efforts especially during the Nineties to minimize the cost of inputs required for rendering their services to account holders at cheaper rates through more and more use of the selected innovated banking services consisting of internet, inter branch banking, phone, mobile and debit & credit cards.

By and large we have followed the procedure of random sampling for drawing samples of a/c holders for primary investigations. The absence of readily available classificatory lists of a/c holders with the banks separately for males and females and also for those using innovated or non-innovated banking services, we have alternatively determined the size of samples to be drawn in accordance with the bank branch wise existing strength of a/c holders, following the principle of higher the strength of a/c holders, higher would be the sample size and vice versa. This way we have selected in all, 600

a/c holders for purposes of primary investigations through a structured questionnaire for them.

**Sample area:** NCR Region' Delhi, Gurgoan, Faridabad, Noida and Ghaziabad

**Sample size:** 600 a/c holders (100 from each bank)

**Sample banks:** ICICI, HDFC, AXIS, SBI, PNB and Allahabad bank

**Sampling technique:** Random sampling

The study is based on the analysis of the data/information collected from both the primary and secondary sources. Collection of primary data has been carried out using the questionnaire for sample a/c holders. Where as the sources of secondary data for use in the study consist of mainly the selected banks, financial institutions, books and articles along with the cooperative bodies, organizations and institutions. For achieving the above objective, we applied several statistical techniques such as

- Cross tab with Chi-square test
- Analysis of Variance (ANOVA)
- Post hoc Multiple Comparisons test i.e.
  - LSD ( Least Significant difference) test.
  - Scheffe and Bonferroni test.
  - Turkey (HSD- honestly significant difference).
- Factor Analysis: to reduce the huge number of variable into some common dimension or factors.

Beside these, several methods of calculating descriptive statistic are also applied as

- Measure of Central tendency.
- Measure of Dispersion.
- Normal plot and to make a general idea about the data.

As we worked on a huge data, manual calculations were not possible for us. Thus to overcome this difficulty we used statistical software such as SPSS 16.0 and MS Excel 2007. All the analysis was performed by SPSS while MS Excel had been used for data entry and Graphical presentation.

***Objective 1: Is all innovated banking services provided by the bank equally good or some services are better than others.***

### **Hypothesis**

**H0:** There is no significance difference among the several innovated services provided by bank on the basis of goodness.

**H1:** There is significance difference among the several innovated services provided by bank on the basis of goodness.

For testing the above hypothesis, we have applied ANOVA (Analysis of Variance) with post-hoc test.

**Descriptives**

Innovated Banking Services Provided by your bank is Very Good

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Phone Banking	544	3.76	.620	.027	3.71	3.82	1	5
Mobile Banking	510	1.37	.662	.029	1.31	1.43	1	4
Card Bankig	537	3.88	1.022	.044	3.79	3.97	2	5
Internet Banking	507	2.64	1.111	.049	2.55	2.74	1	5
Interbranch Bankir	568	3.05	1.696	.071	2.91	3.19	1	5
Total	2666	2.97	1.423	.028	2.91	3.02	1	5

- Out of the sample of 600, 544 use phone banking whose mean goodness score is 3.76 on a scale of 1 to 5 that means phone banking is good.
- Out of the sample of 600, 510 use Mobile banking whose mean goodness score is 1.37 on a scale of 1 to 5 that means mobile banking is not good.
- Out of the sample of 600, 537 use card banking whose mean goodness score is 3.88 on a scale of 1 to 5 that means card banking is good.
- Out of the sample of 600, 507 use internet banking whose mean goodness score is 2.64 on a scale of 1 to 5 that means respondents have the natural feeling about it.
- Out of the sample of 600, 568 use inter branch banking whose mean goodness score is 3.05 on a scale of 1 to 5 that means respondents have the natural feeling about it.

<b>Test of Homogeneity of Variances</b>			
Innovated Banking Services Provided by your bank is Very Good			
Levene Statistic	df1	df2	Sig.
498.456	4	2661	.000

Levene’s test for homogeneity of variance with a significance value of .000 indicates that

variances for goodness scores for each of the innovated banking services provided by banks do indeed differ significantly. Note that these values vary between a narrow variance for phone banking .6202 (=3844) to a much wider variance for intra branch 1.692(=2.8561). Beside this nothing is unusual, so we can probably ignore these results and accept the ANOVA analysis as valid.

ANOVA					
Innovated Banking Services Provided by your bank is Very Good					
	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	2150.324	4	537.581	440.503	.000
Within Groups	3247.432	2661	1.220		
Total	5397.756	2665			

From the above table p-value i.e. .000 is less than .05 (level of significance), hence null hypothesis has been rejected. That means there is a significance difference among the innovated services provided by banks on the basis of goodness.

Since our null hypothesis has been rejected, so there is a need of one step ahead which is "Post Hoc Multiple Comparison test". "Post Hoc" means after the fact. "Multiple Comparisons" means that all possible pairs of factors are compared. There are 14 options if equal variances for levels of the variable are assumed, and an additional 4 if equal variances are not assumed. We have never met anyone who knew them all, or even wanted to know them all. The LSD (least significant difference) is the most liberal of the tests because it is simply a series of t tests. Scheffe and Bonferroni are probably the most conservative of the ser. Turkey (HSD-honestly significant difference) is another popular option.

In our research, we have applied Scheffe and LSD test for doing the pair wise comparisons.

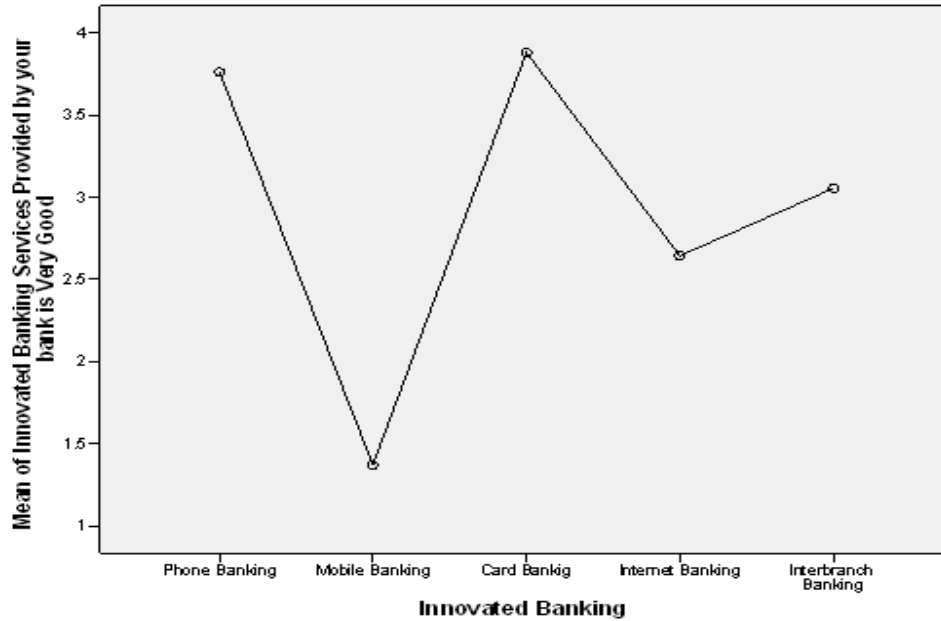
Multiple Comparisons							
Dependent Variable:Innovated Banking Services Provided by your bank is Very Good							
	(I) Frequency of use in a month	(J) Frequency of use in a month	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound

Scheffe	Phone Banking	Mobile Banking	2.392*	.068	.000	2.18	2.60
		Card Bankig	-.118	.067	.545	-.33	.09
		Internet Banking	1.120*	.068	.000	.91	1.33
		Interbranch Banking	.708*	.066	.000	.50	.91
	Mobile Banking	Phone Banking	-2.392*	.068	.000	-2.60	-2.18
		Card Bankig	-2.510*	.068	.000	-2.72	-2.30
		Internet Banking	-1.272*	.069	.000	-1.49	-1.06
		Interbranch Banking	-1.684*	.067	.000	-1.89	-1.48
	Card Bankig	Phone Banking	.118	.067	.545	-.09	.33
		Mobile Banking	2.510*	.068	.000	2.30	2.72
		Internet Banking	1.238*	.068	.000	1.03	1.45
		Interbranch Banking	.826*	.066	.000	.62	1.03
	Internet Banking	Phone Banking	-1.120*	.068	.000	-1.33	-.91
		Mobile Banking	1.272*	.069	.000	1.06	1.49
		Card Bankig	-1.238*	.068	.000	-1.45	-1.03
		Interbranch Banking	-.412*	.067	.000	-.62	-.20
	Interbranch Banking	Phone Banking	-.708*	.066	.000	-.91	-.50
		Mobile Banking	1.684*	.067	.000	1.48	1.89
		Card Bankig	-.826*	.066	.000	-1.03	-.62
		Internet Banking	.412*	.067	.000	.20	.62
LSD	Phone Banking	Mobile Banking	2.392*	.068	.000	2.26	2.53
		Card Bankig	-.118	.067	.079	-.25	.01
		Internet Banking	1.120*	.068	.000	.99	1.25

		Interbranch Banking	.708*	.066	.000	.58	.84
Mobile Banking		Phone Banking	-2.392*	.068	.000	-2.53	-2.26
		Card Bankig	-2.510*	.068	.000	-2.64	-2.38
		Internet Banking	-1.272*	.069	.000	-1.41	-1.14
		Interbranch Banking	-1.684*	.067	.000	-1.82	-1.55
Card Bankig		Phone Banking	.118	.067	.079	-.01	.25
		Mobile Banking	2.510*	.068	.000	2.38	2.64
		Internet Banking	1.238*	.068	.000	1.10	1.37
		Interbranch Banking	.826*	.066	.000	.70	.96
Internet Banking		Phone Banking	-1.120*	.068	.000	-1.25	-.99
		Mobile Banking	1.272*	.069	.000	1.14	1.41
		Card Bankig	-1.238*	.068	.000	-1.37	-1.10
		Interbranch Banking	-.412*	.067	.000	-.54	-.28
Interbranch Banking		Phone Banking	-.708*	.066	.000	-.84	-.58
		Mobile Banking	1.684*	.067	.000	1.55	1.82
		Card Bankig	-.826*	.066	.000	-.96	-.70
		Internet Banking	.412*	.067	.000	.28	.54
*. The mean difference is significant at the 0.05 level.							

On the basis of 'Scheffe' and "LSD' test (Ref. above table) it is clear that there is no significance between phone banking and Card Banking on the basis of goodness, while other pairs have significance differences.

**Means Plot**



Above plot also support the post hoc analysis that there is no significance difference between phone banking and card banking, but at the same time plot also cleared one thing that card banking is best among the all innovated services provided by banks.

Objective 2 - What are the important features behind choosing a Bank?

For achieving above objective, we applied factor analysis with reliability alpha.

**Factor Analysis**

**KMO and Bartlett's Test**

**KMO and Bartlett's Test**

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.			.696
Bartlett's Test of Sphericity	Approx. Chi-Square		12294.877



	Df	36
	Sig.	.000

- KMO and Bartlett's Test is the strength of the relationship among variables large enough. Large values for the KMO measure indicate that a factor analysis of the variables is a good idea. For the example, notice that the Kaiser-Meyer-Olkin measure of sampling adequacy is greater than .90.
- Another indicator of the strength of the relationship among variables is Bartlett's test of sphericity. Bartlett's test of sphericity is used to test the null hypothesis that the variables in the population correlation matrix are uncorrelated. The observed significance level is .0000. It is small enough to reject the hypothesis.
- From above table, it is concluded that the strength of the relationship among variables is strong, because of the value of KMO Statistics is .696 and our null hypothesis for Bartlett's test has been rejected since P-Value is .000. Hence without any hitch we can apply the factor analysis.

**Communalities: Initial vs. Extraction**

- Communalities - This is the proportion of each variable's variance that can be explained by the principal components (e.g., the underlying latent continua). It is also noted as h<sup>2</sup> and can be defined as the sum of squared factor loadings.
- Initial - By definition, the initial value of the communality in a principal components analysis is 1.
- Extraction - The values in this column indicate the proportion of each variable's variance that can be explained by the principal components. Variables with high values are well represented in the common factor space, while variables with low values are not well represented. (In this example, we don't have any particularly low values.). After extraction some of the factors are discarded and so some information is lost. The amount of variance in each variable that can be explained by the retained factor is represented by the communalities after extraction.

**Communalities**

	Initial	Extraction
Q9b	1.000	.957
Q9c	1.000	.924
Q9d	1.000	.970
Q9e	1.000	.933
Q9f	1.000	.939
Q9g	1.000	.948
Q9h	1.000	.980
Q9i	1.000	.983
Q9a	1.000	.447

Extraction Method: Principal Component Analysis.

**Percentage of Variance Accounted for by the two Components Model**

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.260	69.554	69.554	6.260	69.554	69.554	5.623	62.478	62.478
2	1.821	20.232	89.786	1.821	20.232	89.786	2.458	27.308	89.786
3	.632	7.024	96.811						
4	.161	1.791	98.601						
5	.071	.789	99.391						
6	.035	.386	99.777						
7	.018	.198	99.975						
8	.002	.017	99.992						
9	.001	.008	100.000						

Extraction Method: Principal Component Analysis.

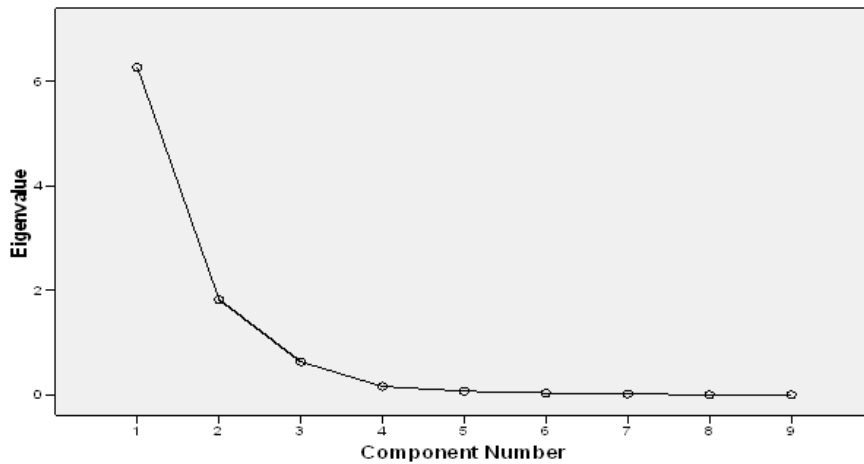
About 89.78 % of the total variance in the 9 variables is attributable to the first 2 components. Also we can judge how well the two-component model describes the original variables, by examine the above table and concluded that Component 1 explains a variance of 5.62, which is 62.47% of total variance of 9 variables and Component 2 explains a variance of 2.45, which is 27.45% of total variance. The amount of variance accounted for by the two components is 8.07, which about 89.78% of the total variance in the 9 variables is attributable to the first 2 components ( $8.07 / 9 = .8978$ ), and remaining 7 components together accounts for 10.33% of the total variance.

**Number of Components to Retain**

The principal components analysis may also be used, like factor analysis, to reduce the number of variables in a data set by finding the smallest possible set of principal components which explain most of the variance in the data set.

- Kaiser suggests only those factors whose eigenvalues are greater than 1 are retained. Two components are to be retained in the study according to his criterion.
- A graphical method called the scree test has been proposed by Cattell, is the another method for finding number of components to be retain. In this method the magnitude of the eigenvalues (vertical axis) are plotted against their ordinal numbers. The magnitude of successive eigenvalues drops off sharply and then tends to level off. Retain all eigenvalues (and hence components) in the sharp descent before the first one on the line where they start to level off. Examine the scree plot. It appears that a two-component model should be sufficient for the study.

Scree Plot



### Rotated Component Matrix

Rotated Component Matrix(a)		
	Component	
	1	2
Q9b	-.978	
Q9g	.970	
Q9d	-.962	
Q9f	.961	
Q9i	.774	-.620
Q9h	.771	-.620

<b>Q9a</b>	- .659	
<b>Q9c</b>		.930
<b>Q9e</b>	- .434	.863
Extraction Method: Principal Component Analysis.		
Rotation Method: Varimax with Kaiser Normalization.		
a Rotation converged in 3 iterations.		

The rotated component matrix is a matrix of factor loadings for each variable onto factor. This matrix contains the same information as the component matrix given above except that it is calculated after rotation. To compare this matrix with the un-rotated matrix solution, most variables are highly loaded onto the first factor and the remaining factors didn't really get a look-in. From this table we can draw following loading of the variable onto factor.

<b>Attractive Factors</b>	<b>Reliability Alpha</b>	<b>Specific Attributes</b>	<b>Factor Loading</b>	<b>Variance Explained</b>
<b>Factor1:Quick and variety of value added Services</b>	.9145	<b>V<sub>9g</sub></b> - Quick Service	.970	<b>62.47%</b>
		<b>V<sub>9f</sub></b> – Convince (24*7)	.961	
		<b>V<sub>9i</sub></b> – Integrated value added services	.774	
		<b>V<sub>9h</sub></b> – Variety of features and services	.771	
		<b>V<sub>9b</sub></b> – Bank familiarity	-.978	
		<b>V<sub>9d</sub></b> – Size of the bank	-.962	
		<b>V<sub>9a</sub></b> –Better Rate	-.659	
<b>Factor2:Bank Location in terms of security and</b>	.8906	<b>V<sub>9c</sub></b> –Bank Location	.930	<b>27.3%</b>
		<b>V<sub>9e</sub></b> –Security of	.863	

convince		transaction		
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From the above table, it is clear that there are two criteria i.e. **“Quick and Variety of Value Added Services”** and **“Bank Location in terms of Security & Convince”** is highly responsible for choosing a bank.

**Component Score Coefficient Matrix**

Component Transformation Matrix		
Component	1	2
1	.925	-.379
2	.379	.925
Extraction Method: Principal Component Analysis.		
Rotation Method: Varimax with Kaiser Normalization.		

Above is the display of the factor score coefficient matrix. Factor scores are the scores of each case on each factor. The factor score coefficients are used to calculate the factor scores of each case for each of the six factors. These scores can be saved to one's dataset for later use as variables in their own right.

**CONCLUSION**

- 1- As the null hypothesis has been rejected. That means there is a significance difference among the innovated services provided by banks on the basis of goodness.
- 2- On the basis of 'Scheffe' and "LSD' test (Ref. above table) it is clear that there is no significance between phone banking and Card Banking on the basis of goodness, while other pairs have significance differences. , but at the same time plot also cleared one thing that card banking is best among the all innovated services provided by banks.
- 3- It is evident from the analysis that out of 9 features given, the two major features has been identified namely “Quick and Variety of Value Added Services” and “Bank Location in terms of Security & Convince” which are highly influencing the respondents toward choosing the bank.

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