

# VIDEO BANKING, A NEW DIMENSION IN MOBILE BANKING

## – A Research on Digital banking in Chennai

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**Abstract :** Traditional Brick and Desk banking (Branch banking) was replaced by Digital Banking since 1990s. Digital Banking has been more popular since 2014 due to the talk of “Digital India”. Mobile banking is a part of Digital banking. Gone are the days when people trusted on trunk dialling (before 1990s). This Trunk dialling was replaced by mobile phones during 1990s. After the advent of mobile phones (after 1990s), mobile phones have been used by several people. Mobile phones were converted into smart phones (since 2010s) and such smart phones have been part and parcel of almost all the people, just like 6<sup>th</sup> finger of palm in our hand. People have been using Smart phones for multiple purposes, such as phone calling, internet usage and so on. Since internet is embedded in mobile phone, this facilitates mobile banking smoothly and quickly. Year 2016, after demonetization (November 8, 2016) forced most of the people to go for Digital banking. Paytm and Mobikwik, Airtel money, Jio money were becoming more popular and people started using mobile banking since then. Video Banking is a new dimension in mobile banking. Very few banks have been following this Video banking, by having a special app. Without app, the customers have to talk to the bank officials by video conferencing method. Very few customers who have been using mobile banking have been using Video banking (25 customers out of 600). They are the corporate customers. This Video conferencing method of banking helps the bank customers to talk to the bankers as if they are seeing them in person. Therefore, personalized attention is possible, integrated with virtual presence. The non users of Video banking (575 out of 600) are also interested to use Video banking very shortly. This innovation has been going on at infancy level since 2016 in various banks. Therefore, it will pick up at speed here in after. Video banking will be a boon to the future generation, both for bankers and customers. Integration of Robots for banking is mostly wanted by customers, by and large. Interactive Teller machines (ITMs) for withdrawal of money are yet another welcoming technology, due to the advent of Video banking. Customers have been using Video banking for bank transactions clarification, documents verification and confirmation, Digital signature confirmation and so on. In near future, Video banking will be flickering its wings at greater speed and start flying at greater heights. Robot banking will also be more popular here in after. City Union Bank has brought an initiative of bringing a small Humanoid Robot (2 feet), namely Lakshmi at T. Nagar branch. The customers in this branch are eager to do banking transactions by using this Robot. Time will come very soon, by integrating all the banking technologies namely, Digital banking, Mobile banking, Robot Banking together, in the name of Collaborative banking (C Banking), to facilitate individualized attention to customers, mass customization, virtual presence and agility in offering banking services. Time is not so far away in this regard, since we are all living in the era of Techno dynamism. This article brings forth the research data related to mobile banking and video banking.

**IndexTerms-** Video banking, Agility banking, Just in time banking, Corporate Banking, Retail Banking, Mobile banking, Collaborative banking (C banking), Digital Banking, Virtual Banking, Robot banking

## I. INTRODUCTION

Mobile banking has been more popular after demonetization on November 8, 2018. Paytm, petty payment through mobile has been understood by the customers by force, since then. Like this, several banks came out with various mobile banking apps for launching the same in their banking. SBI, ICICI Bank, HDFC Bank have brought several apps for mobile banking. Technological dynamism has brought video banking. There is a company namely Vidyo. This company has been providing a specialized software for facilitating Video banking software. In India, some banks started to implement Video banking. Video banking can be done by using apps or video conferencing by using the mobile numbers of bank employees. In near future, several people will use video banking and this will be more popular.

### 1.1 RECENT TECHNOLOGICAL ADVANCEMENTS ON MOBILE BANKING :

Mobile banking

- a. SMS Banking for checking balance enquiry
- b. SMS Banking by using quick codes or SMS codes or Key words
- c. Interactive Voice mechanisms
- d. Banking transactions by using Smart phones – Usage of Apps for doing such banking transactions
- e. Video Banking
- f. Smart watches banking

## 1.2 EMERGING TECHNOLOGICAL ADVANCEMENTS IN FUTURE :

1. Mobile Banking and Digital banking advancements
2. Block chain technology
3. Smart watches
4. Google glasses
5. Upgraded ATMs, ATMs in the name of ITMs (Interactive Teller Machines) for doing multiple banking functions
6. Automated Financial services
7. Strategic partnerships
8. Extended Application Interfaces
9. Artificial Intelligence in Apps and Online banking transactions
10. Extended Security measures by using biometrics and video mechanisms and ensuring higher level security mechanisms
11. Video banking and Extended virtual reality
12. Robot banking
13. Application of Internet of things in retail banking
14. Focus on Retail banking and personalization of banking services
15. Cloud computing technologies and Sky banking

## 1.3 FEW WORDS ABOUT SMS BANKING :

SMSes (Short Message Services) help the customers to communicate to the receiver, by telling the messages very shortly, say within 140 characters. Suppose it happens to increase further, it will be considered as additional messages. In Mobile banking, SMS banking is part and parcel and inevitable. For this purpose, the mobile number has to be linked with the bank account number. The SMS number to which the SMSes have to be sent for banking transactions has to be saved in our mobile. We can do the common banking transactions by using SMS easily. The following are the major quick codes or SMS codes or Key words that are used in SMS Banking.

**BAL** – *The balance of our account will be displayed*

**BAL<space>Account number** – *Balance amount of the given account number will be displayed*

**DETAILS<space>Account number** – *Displays the details of the given account number, namely, name of the account holder, available balance, nick name used in this account and so on*

**TRANSACTIONS<space>Account number** – *Recent 4 transactions will be displayed*

**XFER<space>Account number** – *Transfer of amount from one account number to another account number will happen*

**HELP** – *For seeking mobile banking helps. This will bring list of services where we need helps from bankers*

**STOP** – *This facilitates to stop receiving SMS from bankers automatically*

**PAY<space>Account number<space>amount<space>rem<space>remarks** – *For making payments to the particular account number from our mobile. Rem means last three digits of account number of recipients*

**IMPS<space>account number<space>IFSC code<space>amount<space>rem<space>remarks** – *This makes payment to another account holder of some other banks. Rem means last three digits of account number of recipients*

**IMPS<space>mobile number<space>mmid<space>amount<space>rem<space>remarks** – *This makes mobile payment to the concerned person. Rem means last three digits of account number of recipients.*

## II RESEARCH METHODOLOGY :

This research article has been prepared to meet out a couple of objectives. First, to understand the usage level and satisfactory level of mobile banking and offer suggestions for its improvements. Second, to know the usage level and satisfactory level of video banking and offer suggestions for its improvements. The research has been made in Chennai. Primary data have been collected during the year 2016 – 2018. Multi Stage Quota Sampling method has been followed (MSURS method). For the purpose of sampling, technologically advanced banks were selected, based upon best technological banking award ceremony, 2015 (Table 1 and 2). There are 16 banks available who are the Best technological banking award winners under 9 categories. The banks such as SBI, UBI, IDBI Bank, PNB, IOB, Corporation Bank, Central Bank of India, Bank of India, Andhra Bank are the Best technological banking award winners among Public Sector banks. HDFC Bank, ICICI Bank, Axis Bank, Indus Ind Bank, Karnataka Bank and South Indian Bank are the Best technological banking award winners among Private Sector Banks category. Citi Bank is there under Foreign Bank category (1 bank). Out of 16 banks, only Indian Banks were considered, i.e., 15 Indian banks were selected for sampling purpose (94%). Citi bank is a foreign bank. Therefore, it was not considered. Hence, 9 Public Sector banks and 6 Private Sector banks were selected for the research (Totally 15). From such banks, 40 customers from each bank were contacted for collecting primary data. Among such 15 banks, 40 customers for each bank, totally 600 customers were contacted. Only the customers who have been using Digital Banking technologies were contacted for the purpose of this Research. Non users of Digital Banking were not considered. In order to know the technological adoption of Digital Banking practices, only the users can say the correct information. Therefore, they were alone contacted. By considering Law of inertia and Law of Statistical regularity, the sample size of 600 customers were selected by following Multi Stage Quota Sampling method. Such 600 customers were selected as follows.

### Public Sector Bank customers :

**9 Banks \* 40 customers = 360 customers**

**Such 9 banks are SBI, UBI, IDBI BANK, PNB, IOB, Corporation Bank, Central Bank of India, Bank of India and Andhra Bank (Uniformly 40 customers were selected from each bank)**

**Private Sector Bank customers :**

6 Banks \* 40 customers = 240 customers

Such 6 banks are HDFC Bank, ICICI Bank, Axis Bank, Indus Ind Bank, Karnataka Bank and South Indian Bank (Uniformly 40 customers were selected from each bank)

Such 600 customers were contacted, by bifurcating Corporate Banking customers (300) and Retail Banking customers (300 customers).

**Corporate Banking customers (300 customers) :**

Manufacturers = 100 customers

Traders / Shop keepers = 100 customers

Service Business = 100 customers

**Retail Banking customers (300 customers) :**

Independent Professionals = 100 customers

Employees = 100 customers

Students & Home makers = 100 customers

Totally 714 customers were contacted and filtered into 600 for this research purpose. Due care has been taken by the Researcher to avoid or minimize various errors namely, sampling error, Data errors, Statistical errors (Type I error and Type II errors).

Among such 15 banks, 10 branches were selected (15 banks \* 10 branches in Chennai = 150 bank officers). Such bank branches were selected for contacting bank managers or officers or appropriate authorities to know technological banking adoption practices and innovations to be launched soon. This sample size of 150 has been selected by following Law of inertia and Law of Statistical Regularity. Such banking surveys are not included in this research article. But, such survey details will be brought in another article in future. In this research article, responses of customers are brought forth and presented. A research on Video Banking, a new dimension in mobile banking has been made and some of the results are portrayed in this article. *Statistical tests like Likert Scaling technique (5 point scale), Kruskal Wallis rank test, Spearman's rank correlation, Wilcoxon signed rank test are applied suitably, after validating data.* There are a few limitations. Only Digital banking users are contacted and non users are not considered. Time is yet another constraint. Chennai area (In and around Chennai) is the only area coverage. The responses are psychological in nature, subject to change when technological advancements happen and prosperities do happen.

**TABLE 1 - BEST BANKER AWARD IN LAUNCHING SMART BANKING INITIATIVES**

S.No.	Criteria of Award	Public Sector Bank			Private Sector Bank / Foreign bank in India		
		Winner	First Runner up	Second Runner up	Winner	First Runner up	Second Runner up
1	Technology Bank of the year	SBI	IDBI Bank Ltd	Union Bank of India	HDFC Bank	ICICI Bank	Axis Bank
2	Best Internet Bank	SBI	Union Bank	IDBI Bank Ltd	HDFC Bank	ICICI Bank	Axis Bank
3	Best use of Business Intelligence	SBI	IOB	IDBI Bank Ltd	ICICI Bank	Citi Bank	HDFC Bank
4	Best Customer Management Initiatives	SBI	Punjab National Bank	Andhra Bank	HDFC Bank	Citi Bank	Karnataka Bank
5	Best use of technology in training and e-learning	SBI	Union Bank	Punjab National Bank	ICICI Bank	HDFC Bank	IndusInd Bank
6	Best Risk Management and Security initiative	Punjab National Bank	Union Bank of India	IDBI Bank	ICICI Bank	HDFC Bank	Axis Bank
7	Best Financial Inclusion initiative	SBI	Bank of India	Central Bank of India	ICICI Bank	HDFC Bank	Axis Bank
8	Best use of mobility technology in Banking	SBI	Union Bank of India	Corporation Bank	HDFC / ICICI Banks	NA	Citi Bank
9	Best Payments initiative	Union Bank of India	IDBI Bank Ltd	SBI	ICICI Bank	Citi Bank	South Indian Bank

SOURCE : ERNST & YOUNG GLOBAL LIMITED, LONDON, UNITED KINGDOM. AWARD CEREMONY – 2015

NOTE : Since the primary data were collected in 2016 – 18, Best Banker Award 2015 was considered.

TABLE 2 - PIONEERING BANKS IN LAUNCHING SMART BANKING INITIATIVES

S.No.	Name of the Bank	Number of Awards	Rank	Public Sector / Private Sector
1	STATE BANK OF INDIA	8	I	Public Sector
2	HDFC BANK	8	I	Private Sector
3	ICICI BANK	8	I	Private Sector
4	UNION BANK OF INDIA	6	II	Public Sector
5	IDBI BANK LTD	5	III	Public Sector
6	Axis Bank	4	IV	Private Sector
7	Citi Bank	4	IV	Foreign bank
8	Punjab National Bank	3	V	Public Sector
9	Indian Overseas Bank	1	VI	Public Sector
10	Corporation Bank	1	VI	Public Sector
11	Central Bank of India	1	VI	Public Sector
12	Bank of India	1	VI	Public Sector
13	Andhra Bank	1	VI	Public Sector
14	IndusInd Bank	1	VI	Private Sector
15	Karnataka Bank	1	VI	Private Sector
16	South Indian Bank	1	VI	Private Sector
	TOTAL AWARDS	54		

SOURCE : ERNST & YOUNG GLOBAL LIMITED, LONDON, UNITED KINGDOM. AWARD CEREMONY – 2015

NOTE : Since the primary data were collected in 2016 – 18, Best Banker Award 2015 was considered.

### III MOBILE BANKING :

Mobile banking has been more popular among corporate customers rather than retail banking customers. The research results are portrayed in the following table. Mobile banking has been classified into 7 categories, namely, SMS banking, Call banking, Online banking through Smart phones, Banking through Communication server providers, Petty payments through mobiles, Video Conference banking, Smart watch banking. Sub classifications are also there. The research results are pooled up in the following table.

*Hypothesis : The Corporate banking customers and Retail Banking customers have been using mobile banking services equally well. The data are distributed uniformly.*

TABLE 3 - USAGE OF MOBILE BANKING SERVICES

Mobile banking services	Usage of services					Total	Total	Total	Rank	Weightage – Corporate	Weightage – Retail
	VF	F	O	R	VR	Yes	No	Weightage			
SMS BANKING											
Getting SMS alert as and when any banking transaction happens	588	10	2	NIL	NIL	600	Nil	2986	1	1488	1498
Doing banking transactions by sending quicker codes by SMS	311	98	78	64	49	600	Nil	2358	6	1478	880
CALL BANKING											
Balance Checking, by giving missed call	522	32	28	10	8	600	Nil	2850	2	1400	1450
Satisfactory survey participation by giving missed call	316	88	36	32	128	600	Nil	2232	7	1382	850
ONLINE BANKING BY SMART PHONES											
Doing online banking transactions by Smart phones via bank apps	218	88	86	48	160	600	Nil	1956	8	1112	844
Online banking by mobile, by going to bank websites	318	190	38	54	Nil	600	Nil	2572	4	1462	1110
BANKING THROUGH COMMUNICATION SERVICE PROVIDER											
Banking via Jio money or Airtel money	378	97	66	37	22	600	Nil	2572	3	1461	1112
PETTY PAYMENTS THROUGH MOBILE											
Making payments through Paytm or	388	87	56	42	27	600	Nil	2567	5	1463	1104



Mobikwik											
<b>VIDEO CONFERENCE BANKING</b>											
Video Conferencing and banking transactions by smart phones	20	3	2	Nil	Nil	25	575	<b>118</b>	9	118	Nil
Video Conferencing by laptops or desktop computers	18	4	3	Nil	Nil	25	575	<b>115</b>	10	115	Nil
<b>BANKING THROUGH SMART WATCHES</b>											
Doing banking through smart watches	Nil	Nil	Nil	3	2	5	595	<b>8</b>	11	11	Nil
Total											

Source : Primary data

Note : Weightage points : Very Frequently = 5 points; Frequently = 4 points; Occasionally = 3 points;

Rarely = 2 points; Very Rarely = 1 point

**Spearman's Rank Correlation (based on weightages of corporate banking and retail banking)**  $= [1 - (6\sum d^2 / n^2 (n-1))] = R = +0.52381 = +0.52$  (approx)

Medium level positive degree of correlation

**Please note :** Video banking and Smart watches banking details are related to corporate banking only. Therefore, when correlating corporate banking and retail banking, such details were not considered.

Two tailed p value for rank correlation = 0.18272.

**Therefore, Relationship is very weak, based on p value.**

In the case of unpaired data (Corporate banking and Retail Banking), we can apply **Kruskal Wallis Rank test (based on weightages)**. By applying this test, we find,

$\sum R1 = 118.5$ ;  $\sum R2 = 71.5$ ; H value is 0.4926; p value is 0.48;

Acceptance region of z at  $\alpha = 0.01$  is 2.56

**Calculated value of H is 0.4926 < Table value of acceptance region 2.56. Accept hypothesis. Therefore, it is inferred that the data have been distributed uniformly.**

In the case of unpaired data (Corporate banking and Retail Banking), we can apply **Mann Whitney's U test (based on weightages)**. By applying this test, we find,

$\sum R1 = 118.5$ ;  $\sum R2 = 71.5$ ; U value is 35.5; Table value of U = 31;

Table Value of U1 < Calculated value of U. **Reject Hypothesis.**

**Therefore, Corporate customers and Retail Banking customers do usage of mobile banking services, but their usage level is different. Corporate customers have been using mobile banking more than retail banking customers.**

Z value is 0.66058; Acceptance region of z at  $\alpha = 0.01$  is 2.56

**Calculated value of U is 0.66058 < Table value of acceptance region 2.56. Accept hypothesis. Therefore, it is inferred that the data have been distributed uniformly.**

It is inferred from the above table that Corporate Banking customers have been using mobile banking services mostly well, rather than retail banking customers. In the case of SMS banking, missed call banking only, retail banking customers have been using them more. Video banking and Smart watches banking have been performed only by corporate customers for their business purposes. Statistical tests like U test and KS test prove that the data have been uniformly distributed. U test reveals that corporate customers have been using mobile banking services more than retail banking customers. Rank Correlation between Corporate banking and Retail banking on the usage of mobile banking services reveals that they are correlated positively at medium level (0.52).

#### **SATISFACTION OF MOBILE BANKING SERVICES :**

Whether corporate customers and retail bank customers are satisfied ? To what extent they are satisfied ? The following table brings forth the necessary data.

**Hypothesis :** The Corporate banking customers and Retail Banking customers are satisfied with mobile banking services equally well. The data are distributed uniformly.

**TABLE 4 – SATISFACTION OF MOBILE BANKING SERVICES**

Mobile banking services	Usage of services					Total Yes	Total No	Total Weightage	Rank	Weightage – Corporate	Weightage – Retail
	HS	S	Neu	DS	HDS						
SMS BANKING											
Getting SMS alert as and when any banking transaction happens	590	10	Nil	Nil	Nil	600	Nil	2990	1	1597	1493
Doing banking transactions by sending quicker codes by SMS	318	101	82	54	45	600	Nil	2393	6	1481	912
CALL BANKING											
Balance Checking, by giving missed call	528	38	32	2	Nil	600	Nil	2892	2	1406	1486
Satisfactory survey participation by giving missed call	322	92	45	33	108	600	Nil	2287	7	1396	891
ONLINE BANKING BY SMART PHONES											
Doing online banking transactions by Smart phones via bank apps	222	92	90	52	144	600	Nil	1996	8	1116	880
Online banking by mobile, by going to bank websites	320	192	88	Nil	Nil	600	Nil	2632	5	1476	1156
BANKING THROUGH COMMUNICATION SERVICE PROVIDER											
Banking via Jio money or Airtel money	402	102	67	27	2	600	Nil	2675	4	1482	1193
PETTY PAYMENTS THROUGH MOBILE											
Making payments through Paytm or Mobikwik	404	106	80	10	Nil	600	Nil	2704	4	1484	1220
VIDEO CONFERENCE BANKING											
Video Conferencing and banking transactions by smart phones	21	3	1	Nil	Nil	25	575	120	10	120	Nil
Video Conferencing by laptops or desktop computers	22	2	1	Nil	Nil	25	575	121	9	121	Nil
BANKING THROUGH SMART WATCHES											
Doing banking though smart watches	3	2	Nil	Nil	Nil	5	595	23	11	23	Nil
Total											

Source : Primary data

Note : Weightage points : HS – Highly satisfied = 5; S – Satisfied = 5; Neu – Neutrally satisfied = 3; DS – Dissatisfied = 2; HDS – Highly dissatisfied = 1

**Spearman's Rank Correlation (based on weightages of corporate banking and retail banking)** =  $[1 - (6\sum d^2 / n^2 (n-1))] = R = +0.7381 = +0.74$  (approx)

High level positive degree of correlation

**Please note :** Video banking and Smart watches banking details are related to corporate banking only. Therefore, when correlating corporate banking and retail banking, such details were not considered.

Two tailed p value for rank correlation = 0.03655.

**Therefore, Relationship is moderate, based on p value.**

In the case of unpaired data (Corporate banking and Retail Banking), we can apply **Kruskal Wallis Rank test (based on weightages)**. By applying this test, we find,

$\sum R1 = 113$ ;  $\sum R2 = 77$ ; H value is 0.0614; p value is 0.80;

Acceptance region of z at  $\alpha = 0.01$  is 2.56

**Calculated value of H is 0.0614 < Table value of acceptance region 2.56.**

**Accept hypothesis**

In the case of unpaired data (Corporate banking and Retail Banking), we can apply **Mann Whitney's U test (based on weightages)**. By applying this test, we find,

$\sum R1 = 113$ ;  $\sum R2 = 77$ ; U value is 41; Table value of U = 31;

Table Value of U1 < Calculated value of U. **Reject Hypothesis.**

**Therefore, Corporate customers and Retail Banking customers get satisfaction on mobile banking services, but their satisfactory level is different. Corporate customers have been satisfied with mobile banking more than retail banking customers.**

Z value is 0.20643;

Acceptance region of z at  $\alpha = 0.01$  is 2.56

**Calculated value of U is 0.20643 < Table value of acceptance region 2.56.**

**Accept hypothesis**

It is inferred from the above table that Corporate Banking customers have been satisfied with mobile banking services mostly well, rather than retail banking customers. Video banking and Smart watches banking have been performed only by corporate customers for their business purposes. They are satisfied with such services. Statistical tests like U test and KS test prove that the data have been uniformly distributed. U test reveals that corporate customers have been satisfied with mobile banking services more than retail banking customers. Rank Correlation between Corporate banking and Retail banking on the usage of mobile banking services reveals that they are correlated positively at high level (0.74).

## RELATIONSHIP BETWEEN USAGE AND SATISFACTION ON MOBILE BANKING SERVICES :

From Table number 3 and 4, correlation has been made between the usage and satisfaction on mobile services. The results are as follows.

**Hypothesis : The usage level and satisfactory level on mobile banking services are correlated positively among the Corporate banking customers and Retail Banking customers at equal level. The data are distributed uniformly.**

**Spearman's Rank Correlation (based on total weightages of usage and satisfactory level) =  $[1 - (6\sum d^2 / n^2 (n-1))] = R$**   
**= +0.96128 = + 0.96 (approx)**

Higher level positive degree of correlation

Two tailed p value for rank correlation = 0.00001.

**Therefore, Relationship is very strong, based on p value.**

In the case of paired data, we can apply **Kruskal Wallis Rank test (based on total weightages of usage level and satisfactory level)**. By applying this test, we find,

$\sum R1 = 117$ ;  $\sum R2 = 136$ ; H value is 0.3891; p value is 0.53;

Acceptance region of z at  $\alpha = 0.01$  is 2.56

**Calculated value of H is 0.3891 < Table value of acceptance region 2.56.**

**Accept hypothesis**

In the case of paired data, we can apply **Kruskal Wallis Rank test (based on total weightages of usage level and satisfactory level for corporate banking and retail banking = totally 4 criteria)**. By applying this test, we find,

$\sum R1 = 213.5$ ;  $\sum R2 = 129$ ; H value is 1.1928; p value is 0.75;

Acceptance region of z at  $\alpha = 0.01$  is 2.56

**Calculated value of H is 1.1928 < Table value of acceptance region 2.56. Accept hypothesis**

In the case of paired data (based on total weightages of usage level and satisfactory level), we can apply **Mann Whitney's U test (based on total weightages)**. By applying this test, we find,

$\sum R1 = 117$ ;  $\sum R2 = 136$ ; U value is 51; Table value of U = 31;

Table Value of U1 < Calculated value of U. **Reject Hypothesis.**

**Therefore, Corporate customers and Retail Banking customers get satisfaction on mobile banking services, but their satisfactory level is different. Corporate customers have been using mobile banking and they are highly satisfied with mobile banking more than retail banking customers.**

Z value is 0.593;

Acceptance region of z at  $\alpha = 0.01$  is 2.56

**Calculated value of U is 0.59 < Table value of acceptance region 2.56. Accept hypothesis**

In the case of paired data (usage level and satisfactory level), we can apply **Wilcoxon Signed Rank test (based on weightages)**. By applying this test, we find,

$\sum R1 = 117$ ;  $\sum R2 = 136$ ; W value is 0; Z value is 2.43;

Acceptance region of z at  $\alpha = 0.01$  is 2.56

**Calculated value of 2.43 is < Table value of acceptance region 2.56. Accept hypothesis**

It is inferred from table 3 and 4 that Corporate Banking customers have been using mobile banking services and they have been satisfied with such services mostly well, rather than retail banking customers. Video banking and Smart watches banking have been performed only by corporate customers for their business purposes. They are satisfied with such services. SMS Banking and Call banking have been used by Retail banking customers more and they are satisfied well. Statistical tests like U test, Wilcoxon signed rank test and KS test prove that the data have been uniformly distributed. U test reveals that corporate customers have been satisfied with mobile banking services more than retail banking customers. Rank Correlation between Corporate banking and Retail banking on the usage of mobile banking services reveals that they are correlated positively at higher level (0.96).

#### BENEFITS ENJOYED ON MOBILE BANKING SERVICES :

Mobile banking services facilitate the customers to do banking transactions easily and quickly. Agility banking or Just in time banking is possible because of mobile banking. The following table highlights the necessary data.

**Hypothesis : Corporate customers and retail banking customers have been enjoying mobile banking services equally well. The data are distributed uniformly.**

**TABLE 5 - BENEFITS ON MOBILE BANKING SERVICES ENJOYED BY THE CUSTOMERS**

Mobile banking services	Satisfactory attitude					Total	Weightage points	Rank	Weightage – Corporate	Weightage – Retail
	HS	S	Neu	DS	HDS					
Arrival of SMS as and when transactions happen help us to know balance amount correctly	581	17	2	Nil	Nil	600	2979	1	1499	1480
Online banking transactions by using smart phones ease banking activities	447	84	69	Nil	Nil	600	2778	5	1399	1379
Doing banking transactions becomes easy due to mobile banking by SMS	228	186	97	67	22	600	2331	6	1176	1155
Balance Checking by giving missed call	526	36	38	Nil	Nil	600	2888	4	1464	1424
Missed call for dissatisfaction registration	530	40	30	Nil	Nil	600	2900	3	1432	1468
Agility banking – Just in time banking	518	65	17	Nil	Nil	600	2901	2	1420	1381
Total							16777			

Source : Primary data

Note : Weightage points : HS – Highly satisfied = 5; S – Satisfied = 5; Neu – Neutrally satisfied = 3; DS – Dissatisfied = 2; HDS – Highly dissatisfied = 1

**Spearman's Rank Correlation (based on weightages)** =  $[1 - (6\sum d^2 / n^2 (n-1))] =$

$R = +0.94286 = +0.94$  (approx)

Higher level positive degree of correlation

Two tailed p value for rank correlation = 0.0048.

**Therefore, Relationship is very strong, based on p value.**

In the case of paired data (Corporate banking and Retail Banking), we can apply **Wilcoxon Signed Rank test (based on weightages)**. By applying this test, we find,

$\sum R1 = 42$ ;  $\sum R2 = 36$ ; W value is 4; Z value is 1.3628;

Acceptance region of z at  $\alpha = 0.01$  is 2.56

**Calculated value of 1.3628 is < Table value of acceptance region 2.56. Accept hypothesis**

In the case of paired data (Corporate banking and Retail Banking), we can apply **Kruskal Wallis Rank test (based on weightages)**. By applying this test, we find,

$\sum R1 = 42$ ;  $\sum R2 = 36$ ; H value is 0.2308; p value is 0.63;

Acceptance region of z at  $\alpha = 0.01$  is 2.56

**Calculated value of H is 0.2308 < Table value of acceptance region 2.56. Accept hypothesis**

SMS alert makes the customers to know the balance amount in their account as and when transaction happens (Rank 1). Agility banking is possible (Rank 2). Missed call for dissatisfaction makes the customers to express their feelings immediately (Rank 3). Missed call for balance checking eases bank transactions (Rank 4). Further, it is learned by applying various statistical tests such as KS test, Wilcoxon Signed Rank rest that data are distributed normally. Both corporate customers and retail banking customers have been enjoying the benefits of mobile banking equally well. The relationship between them is higher level positive degree (0.94).



**COMMON PROBLEMS OF MOBILE BANKING SERVICES :**

Even though bankers have been enjoying benefits, certain problems are also there. The following table highlights the necessary data.

**Hypothesis : Corporate customers and retail banking customers have been suffering from problems on mobile banking services equally. The data are distributed uniformly.**

**TABLE 6 - COMMON PROBLEMS OF MOBILE BANKING SERVICES FELT BY THE CUSTOMERS**

Mobile banking services	Satisfactory attitude					Total	Weightage points	Rank	Weightage – Corporate	Weightage – Retail
	HF	F	Neu	LF	VLF					
Frequent SMSes disturb unnecessarily	316	88	36	32	128	600	<b>2232</b>	5	1132	1100
Poor network problem	418	84	38	34	26	600	<b>2634</b>	2	1334	1300
SMS locking may be done by any hacker secretly	388	87	56	42	27	600	<b>2567</b>	3	1354	1213
While using Smart phones for banking transactions, double entry or problem happens due to network issues	522	31	28	10	8	600	<b>2846</b>	1	1436	1410
Account hacking threat by hacker	378	77	66	52	27	600	<b>2527</b>	4	1314	1213
Loss of smart phone and misuse of bank account	18	10	8	3	1	40	<b>161</b>	8	37	124
Theft of smart phone and misuse of bank account	20	12	5	2	1	40	<b>168</b>	6	38	130
Strangers identify pattern or pass word of smart phone, take it and misuse it	18	15	3	3	1	40	<b>166</b>	7	36	130
Total							<b>13301</b>			

Source : Primary data

Note : HF – Highly felt; F – Felt; Neu – Neutrally felt; LF – Least felt; VLF – Very least felt Weightage points : HF – Highly felt = 5; F – Felt = 4; Neu – Neutrally felt = 3; LF – Least felt = 2; VLF – Very least felt = 1

**Spearman's Rank Correlation (based on weightages)**  $= [1 - (6\sum d^2 / n^2 (n-1))] =$

$R = +0.91573 = +0.92$  (approx)

Higher level positive degree of correlation

Two tailed p value for rank correlation = 0.0014.

**Therefore, Relationship is very strong, based on p value.**

In the case of paired data (Corporate banking and Retail Banking), we can apply **Wilcoxon Signed Rank test (based on weightages)**. By applying this test, we find,

$\sum R1 = 69$ ;  $\sum R2 = 67$ ; W value is 15; Z value is 0.42;

Acceptance region of z at  $\alpha = 0.01$  is 2.56

**Calculated value of 0.42 is < Table value of acceptance region 2.56. Accept hypothesis**

In the case of paired data (Corporate banking and Retail Banking), we can apply **Kruskal Wallis Rank test (based on weightages)**. By applying this test, we find,

$\sum R1 = 69$ ;  $\sum R2 = 67$ ; H value is 0.011; p value is 0.91;

Acceptance region of z at  $\alpha = 0.01$  is 2.56

**Calculated value of H is 0.011 < Table value of acceptance region 2.56. Accept hypothesis**

It is observed from the above table that double entry may happen because of network issues (Rank 1), followed by poor network problems (Rank 2), SMS locking may be done by strangers (Rank 3), Account hacking issues (Rank 4) and disturbances due to SMS unnecessarily (Rank 5). Some of the customers (40 customers out of 600) suffered a lot due to loss of their smart phone, misuse of their smart phone by strangers, loss of amount from their account due to abuse of their smart phones. It is analysed from KS test, Wilcoxon Signed Rank test that the data are distributed normally. Both corporate customers and retail banking customers have been suffering from problems on mobile banking equally. The relationship by Rank Correlation expresses that they are related very strongly at higher level of positive degree (0.92).

**IMPROVEMENT OF MOBILE BANKING SERVICES :**

“Challenges are the stepping stones for winning”. “Criticisms are the inducing fertilizers for the constructive growth of any novel ideas”. Like these verses, several improvements were suggested by customers on mobile banking development. They are listed as follows.

**SMS BANKING :**

Regarding SMS banking, SMS locking by strangers must be informed to alternative mobile number of customers. Like this suggestion, several suggestions are made by the customers. They are pooled up in the following table.

**Hypothesis : Corporate customers and retail banking customers have been offering suggestions for the improvement on SMS banking equally well. The data are distributed uniformly.**

**TABLE 7****ATTITUDE ON IMPROVEMENT EXPECTED IN SMS BANKING SERVICES SUGGESTED BY THE CUSTOMERS**

Mobile banking services	Satisfactory attitude					Total	Weightage points	Rank	Weightage – Corporate	Weightage – Retail
	MNP	NP	Neu	O	LN					
In the case of savings bank account, SMS on balance has to come as and when transaction happens	522	42	36	Nil	Nil	600	2886	2	1400	1486
In the case of current account, SMS has to come once in a day (say 9 pm daily)	316	88	36	32	128	600	2232	10	1432	800
SMS locking aspect (by hacker) has to be informed to the banker or alternative mobile of customer immediately	524	44	32	Nil	Nil	600	2892	1	1486	1406
Loss or theft of ATM card or credit card has to be informed by SMS to the banker by a special quick code	418	100	82	Nil	Nil	600	2736	5	1431	1305
In the case of RD and FD, the aggregate amount till date has to be informed by SMS once in a month (end of the month)	420	98	82	Nil	Nil	600	2738	4	1432	1306
In the case of loan account, the net balance payable has to be informed as and when transaction happens	316	188	96	Nil	Nil	600	2620	6	1421	1199
SMS regarding loan payment reminder is needed, before one week of due date	422	98	80	Nil	Nil	600	2742	3	1422	1320
Insurance premium deduction has to be informed to the customer one week before, in order to maintain sufficient balance	319	185	73	23	Nil	600	2600	7	1400	1200
Cheque dishonor & bill dishonor details have to be informed to the customer as and when happens	284	162	84	36	34	600	2426	8	1428	1998
All the banks must have quick codes in SMS banking. This eases mobile banking	326	98	56	42	78	600	2352	9	1272	1080
<b>Total</b>							26224			

Source : Primary data

Note : Weightage points : MNP – Most Necessary and top priority = 5; N – Necessary and moderate priority = 4; Neu – Neutrally necessary (moderately) = 3; O – Optional = 2; LN – Least necessary = 1

**Spearman's Rank Correlation (based on weightages) =  $[1 - (6\sum d^2 / n^2 (n-1))] =$**

**$R = +0.16464 = +0.16$  (approx)**

**Lower level positive degree of correlation**

**Two tailed p value for rank correlation = 0.6494.**

**Therefore, Relationship is very weak, based on p value.**

**In the case of paired data (Corporate banking and Retail Banking), we can apply Wilcoxon Signed Rank test (based on weightages). By applying this test, we find,**

**$\sum R1 = 129.5$ ;  $\sum R2 = 80.5$ ; W value is 11; Z value is 1.6818;**

**Acceptance region of z at  $\alpha = 0.01$  is 2.56**

**Calculated value of 1.6818 is < Table value of acceptance region 2.56. Accept hypothesis**

In the case of paired data (Corporate banking and Retail Banking), we can apply **Kruskal Wallis Rank test (based on weightages)**. By applying this test, we find,

$$\sum R1 = 129.5; \quad \sum R2 = 80.5; \quad H \text{ value is } 3.43; \quad p \text{ value is } 0.0642;$$

Acceptance region of  $z$  at  $\alpha = 0.05$  is 3.52

Calculated value of  $H$  is 3.43 < Table value of acceptance region 3.52. Accept hypothesis

SMS locking or hacking has to be informed by SMS to an alternative mobile number of the customer (Rank 1). Instant SMS for SB account, Account summary SMS at the end of the day for Current account (Rank 2) will be enough instead of having frequent SMSes that are horrible. SMS regarding payment reminder is essential to make necessary arrangement in business (Rank 3). It is learned by applying various statistical tests namely KS test, Wilcoxon Signed Rank test that the data are distributed normally. Corporate customers have been offering more suggestions (because of more usage) rather than retail banking customers. The relationship between suggestions offered by corporate customers and retail banking customers is lower positive degree (0.16).

## II. ONLINE BANKING BY USING SMART PHONES :

Online banking transactions can be done either through bank apps or bank websites, by using Smart phones. The suggestions on the improvement of such services are listed in the following table.

**TABLE 8 - ATTITUDE ON IMPROVEMENT EXPECTED IN ONLINE BANKING BY SMART PHONES SUGGESTED BY THE CUSTOMERS**

Mobile banking services	Satisfactory attitude					Total	Weightage points	Percentage	Rank
	MNP	NP	Neu	O	LN				
Integration of Video Conferencing with bank officials (Video banking)	424	82	54	33	7	600	2689	15.08	3
Security strength is needed in mobile banking by modern technologies	428	86	56	23	7	600	2705	15.20	2
Banker has to conduct meetings with customers atleast once in 3 months to teach technological upgradations done by the banker	316	99	65	42	78	600	2333	13.11	7
Banker has to resolve mobile banking problems in time.	326	98	56	42	78	600	2352	13.21	6
All the banks need to have satisfactory surveys by having missed call	284	168	90	34	24	600	2454	13.79	4
Specialised apps need to be developed by all the banks and to be launched at the earliest	514	56	30	Nil	Nil	600	2884	16.20	1
Need for computer integrated voice by using toll free number for each and every bank	274	158	80	54	34	600	2384	13.40	5
Total							17,801	100.00	

Source : Primary data

Note : Weightage points : MNP – Most Necessary and top priority = 5; N – Necessary and moderate priority = 4; Neu – Neutrally necessary (moderately) = 3; O – Optional = 2; LN – Least necessary = 1

All the banks need to create special apps for mobile banking (Rank 1). Information Security is the major necessity (Rank 2), followed by Video banking necessity (Rank 3).

## VIDEO BANKING :

The corporate customers (25 out of 600) have been using video conferencing with the bank officials for accelerating their bank transactions and to do their bank transactions fairly well. The following table tells what modes are being utilized by the corporate customers for video banking.

**TABLE 9 - MODE OF USAGE OF VIDEO BANKING SERVICES**

Video banking services - modes	Usage of services					Total	Weightage points	Percentage	Rank
	VF	F	O	R	VR				
Smart phone	23	2	Nil	Nil	Nil	25	123	27.58	1
Tabs	8	7	6	3	1	25	93	20.85	4
Laptops	22	2	1	Nil	Nil	25	121	27.13	2
Desktop computers	16	4	3	2	Nil	25	109	24.44	3
Total							446	100.00	

Source : Primary data

Note 2 : Weightage points : VF -Very Frequently = 5 points; F - Frequently = 4 points; O - Occasionally = 3 points; R - Rarely = 2 points; VR – Very Rarely = 1 point

It is understood from the above table that corporate customers have been using Smart phones for video banking (Rank 1), followed by Laptops (Rank 2), Desktop computers at their offices or homes (Rank 3) and Tabs (Rank 4). Smart phones and Laptops are the major modes used by the corporate customers for video banking.

#### USAGE OF VIDEO BANKING SERVICES AND SATISFACTORY LEVEL :

Bank transaction clarification and Document clarification aspects are the major purposes for which video banking has been used by the corporate customers. The following table brings forth the necessary data.

**Hypothesis : The usage level and satisfactory level of video banking services are equal. The data are distributed uniformly.**

**TABLE 10 - USAGE AND SATISFACTORY LEVEL OF VIDEO BANKING SERVICES**

Video banking services	Usage of services					Total	W1	Rank	Satisfaction on services						W2	Rank
	VF	F	O	R	VR				HS	S	Neu	DS	HDS	Total		
Bank transaction clarification	24	1	Nil	Nil	Nil	25	124	1	23	2	Nil	Nil	Nil	25	123	1
Digital signature approval and confirmation	21	3	1	Nil	Nil	25	120	3	20	4	1	Nil	Nil	25	119	3
Bearer cheque confirmation	11	6	5	3	Nil	25	100	5	12	8	7	Nil	Nil	25	113	5
Bill of exchange clarification and confirmation	5	5	6	5	4	25	77	7	16	6	3	Nil	Nil	25	113	6
Loans obtaining and settlement clarification	6	5	5	4	5	25	78	6	10	9	6	Nil	Nil	25	104	8
Documents verification over	22	2	1	Nil	Nil	25	121	2	22	2	1	Nil	Nil	25	121	2
Online banking problems - solutions	18	4	3	Nil	Nil	25	115	4	20	3	2	Nil	Nil	25	118	4
Complaints lodging and solutions	4	3	3	4	11	25	60	8	16	4	3	2	Nil	25	109	7
Total																

Source : Primary data

Note : Percentages are available in brackets

Note 2 : Weightage points : VF -Very Frequently = 5 points; F - Frequently = 4 points; O - Occasionally = 3 points; R - Rarely = 2 points; VR – Very Rarely = 1 point

**Spearman's Rank Correlation (based on weightages)**  $= [1 - (6\sum d^2 / n^2 (n-1))] =$

$R = +0.9102 = +0.91$  (approx)

Higher level positive degree of correlation

Two tailed p value for rank correlation = 0.00169.

**Therefore, Relationship is strong, based on p value.**

In the case of paired data, we can apply **Wilcoxon Signed Rank test (based on weightages)**. By applying this test, we find,

$\sum R1 = 60.5$ ;  $\sum R2 = 75.5$ ;

W value is 3; Z value is 1.85;

Acceptance region of z at  $\alpha = 0.01$  is 2.56

**Calculated value of 1.85 is < Table value of acceptance region 2.56. Accept hypothesis**

Corporate customers have been using Video banking facility, mainly for clarification of bank transactions (Rank 1), followed by documents verification over phone (Rank 2), Digital signature approval confirmation (Rank 3), online banking problems and solutions with bank employees (Rank 4) and complaints lodging and solutions (Rank 5). The data are distributed normally, by analyzing by Wilcoxon test. The relationship between the usage level and satisfactory level are correlated positively, strongly at higher level positive degree (0.91). Both usage level and satisfactory level are at equal level.

#### COMMON PROBLEMS ON VIDEO BANKING :

Corporate customers have been facing some problems on video banking commonly. They are pooled up in the following table.



**TABLE 11 - COMMON PROBLEMS ON VIDEO BANKING SERVICES FACED BY THE CUSTOMERS**

Video banking services	Satisfactory attitude					Total	Weightage points	Percentage	Rank
	HF	F	Neu	LF	VLF				
Light background issues	18	3	2	1	1	25	111	12.05	6
Colour, hue and pixels issues	14	4	3	2	2	25	101	10.97	8
Mobile software compatibility issues	12	6	5	1	1	25	102	11.07	7
Pass word security issues	23	1	1	Nil	Nil	25	122	13.25	2
Hacking problems	21	3	1	Nil	Nil	25	120	13.03	4
Blue tooth issues – nearby strangers would receive our video clippings	23	1	1	Nil	Nil	25	122	13.25	3
Loss of smart phones may be misused for mishandling bank account	21	2	2	Nil	Nil	25	119	12.92	5
Network issues	24	1	Nil	Nil	Nil	25	124	13.46	1
Total								100.00	

Source : Primary data

Note 1 : R1 – Rank 1; R2 – Rank 2; W1 – Weightage for users; W2 – Weightage for non users

Note 2 : HF – Highly felt; F – Felt; Neu – Neutrally felt; LF – Least felt; VLF – Very least felt Weightage points : HF – Highly felt = 5; F – Felt = 4; Neu – Neutrally felt = 3; LF – Least felt = 2; VLF – Very least felt = 1

It is observed from the above table that network issues are the major worries (Rank 1), followed by pass word security issues (Rank 2), Blue tooth issues (Rank 3), Hacking issues (Rank 4), loss of smart phone fear issues (Rank 5).

#### POSSIBLE IMPROVEMENTS ON VIDEO BANKING :

Corporate users who have been using Video banking answered the possible improvements on Video Banking. Besides, non users of Video banking (but users of Digital Banking) have also answered this questions. The following table portrays the necessary data.

**Hypothesis : The improvements on Video banking expected by users and non users are at equal level. The data are distributed uniformly.**

**TABLE 12 - IMPROVEMENTS EXPECTED IN VIDEO BANKING**

(by regular users and non users, but users of digital banking)

Video banking services - usages	Regular users					Tot	W1	R1	Non users, but users of Digital banking						W2	R2
	MNP	NP	Neu	O	LN				MNP	NP	Neu	O	LN	Tot		
24/7 Video Banking service	20	2	2	1	Nil	25	116	5	542	15	14	3	1	575	2819	6
Usage of Robots for banking transactions, for video conferencing	19	3	2	1	Nil	25	115	6	558	7	5	4	1	575	2842	5
Interactive Teller Machines need to come (Video conferencing ATMs)	25	Nil	Nil	Nil	Nil	25	125	1	570	4	1	Nil	Nil	575	2869	1
Capturing overseas customers and having banking transactions	18	3	2	2	Nil	25	112	7	431	49	32	24	39	575	2534	8
Specialised apps are needed for video banking separately	24	1	Nil	Nil	Nil	25	124	2	569	2	2	1	1	575	2862	2
Video conferencing may be recorded for documentation purpose – Paperless documentation	6	6	6	5	2	25	84	8	441	38	32	34	30	575	2551	7
Offline mode has to be created to avoid network issues	23	2	Nil	Nil	Nil	25	123	3	561	5	4	3	2	575	2845	4
User friendly smart phone softwares need to be developed to avoid mobile system compatibility issues	22	3	Nil	Nil	Nil	25	122	4	562	5	4	3	1	575	2849	3
Total							921								22171	

Source : Primary data

Note 1 : R1 – Rank 1; R2 – Rank 2; W1 – Weightage for users; W2 – Weightage for non users

Note 2 : Weightage points : MNP – Most Necessary and top priority = 5 Points; N – Necessary and moderate priority = 4 Points; Neu – Neutrally necessary (moderately) = 3 points; O – Optional = 2 points ; LN – Least necessary = 1 point

**Spearman's Rank Correlation (based on ranks)** =  $[1 - (6\sum d^2 / n^2 (n-1))] =$

$R = +0.92857 = +0.93$  (approx)

Higher level positive degree of correlation

Two tailed p value for rank correlation = 0.00086.

**Therefore, Relationship is very strong, based on p value.**

In the case of paired data, we can apply **Wilcoxon Signed Rank test (based on ranks)**. By applying this test, we find,

$\sum R1 = 68$ ;  $\sum R2 = 68$ ;

W value is 10.5; Z value is 0.001;

Acceptance region of z at  $\alpha = 0.01$  is 2.56

**Calculated value of 0.001 is < Table value of acceptance region 2.56. Accept hypothesis**

It is learned from the above table that the users and non users want to have Interactive Teller Machines (ITMs), improved version of ATMs (Rank 1). Such ITMs would capture the videos of persons who use ITMs and we can interact with the machines for withdrawing money or making deposits with the money. This will be a boon to all, particularly to computer illiterates. Specialised apps are needed for Video Banking (Rank 2). All banks need to develop such apps compulsorily. Offline support system is needed (Rank 3). User friendly phone softwares are needed (Rank 4). Any time (24/7) Video banking services with the help of Automated computerized Robots will facilitate the customers more delighted (Rank 5). Wilcoxon test proves that the data are distributed normally. The suggestions of users and non users are equally made. The relationship between the improvements suggested by the users and non users are correlated positively at higher positive degree (0.93). This shows that non users are also willing to invite Video banking whole heartedly.

## VI CONCLUSION :

Digital Banking has given birth to mobile banking. If mother jumps for 8 feet, child jumps for 16 feet. Mobile banking has been more popular among various bank customers. Similarly, Mobile banking delivers a baby called Video banking. This infant will jump more than 100 feet probably in near future. Robots started its functioning in City Union Bank, T. Nagar, Chennai and ICICI Bank, Bangalore. Video banking integrated with Robot banking will become more popular here in after. Therefore, so far ignored personalized attention will be taken into consideration and integrated with virtual presence. Collaborative banking will come very soon, by integrating, Digital banking, Mobile banking, Video banking, Robot banking together. Let us all welcome the new technologies here in after also.

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