FACTOR ANALYSIS OF KEY DIMENSIONS AFFECTING BANKING SELF-SERVICE TECHNOLOGY CHANNELS

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ABSTRACT

Self-Service Technologies are innovations empowering the customers to operate the service themselves without the support of the service organization's staff. The service organization offers a technical platform like an app, kiosk, and card that can be quickly, easily, and conveniently used by the customer to perform the service of their choice. This paper examines and discovers the key dimensions of diverse important factors that influence the application of multiple banking self-service technology avenues. The research used convenience along with judgment sampling methods and administered the pre-tested structured questionnaire to 686 respondents in the Chandigarh region. The application of factor analysis extracted eight factor solutions. These are cited in this research as technology transition, mobile banking usage, internet banking adoption, ATM services, SSTs acceptance, customer satisfaction, customer loyalty, and credit card acceptance.

Key-Words: *SST channels, Banking, Innovation, Technology, quality, Credit Card.*

INTRODUCTION

The incorporation of technology in the services has revolutionized the service delivery and improved the efficiency of their businesses. Due to intense competition and the influence of globalization, service companies are investigating alternative delivery options that enable clients to execute services themselves. Customers have gained access to services through technology rather than via direct interaction with service employees. SSTs are technology interfaces that allow clients to generate a service without the intervention of direct service employees. (Dabholkar, 1996). Most services are now begun and carried out by clients alone, with no support from service providers. Self-service technology has completely engulfed the service industry. To remain competitive, service providers are always upgrading the quality

of their service operations. Service sectors are providing combinations of SST interfaces for faultless customer service delivery as multichannel marketing grows (Muhammad Shahid, et.al. 2010). Different types of self-service technology are accessible in many service businesses. Self-checkout at hotels and retail outlets, self-pumping stations, self-check- in at airports, online shopping, package tracking, mobile banking, flight information are some of the self-service technologies. These technologies have benefited the business in the form of lower service costs, increased efficiency and competitiveness. Customers are also in an advantageous position due to these technologies. They are having more control over service transactions. Customers value the convenience and consistency of these technologies with a friendly smile.

REVIEW OF LITERATURE

The study conducted a thorough survey of research publications on the relevant topic to identify the recent trends and identify the research gap. Some of the important research reviews are mentioned in the following paragraphs.

Anguelov, C. et al (2004) The researcher conducted a survey on the perception of consumers, their characteristics and relation between factors and characteristics of online banking products as well services. The usage of e-banking technologies is rising consistently in different sectors. The use of ATM cards is steadily shifted the use towards IB or debit cards, but the accessibility of IB products mostly found among youngsters, educated class or high-profile group.

Mallat, N (2004). The study investigated the use of MB by consumers with the technology of electronic payment service, mobile payments was done. The rise in adoption of MB could also be in advantage due to lack of other modes of transaction. But on another side the issues that restrict the use of MB or adoption of mobile payments were lack of widespread merchant acceptance, complexity, premium pricing, perceived risks. To motivate the customers towards 3G MB services the study of innovation factor and the customer risk perception was examined, also to tolerate with behavior of customers in UK. With the study of customer's response and related factors, the survey helped to understand the advantages as well as disadvantages of 3G MB technology.

Khanna (2007) studied that 95% of people in favor of ATM rather than conventional banking; whereas survey also revealed that $2/3^{rd}$ of users used the service (ATM), more than once in 15 days. Multiple channels were established to provide convenience in banking services for customers stated by Shrotriya (2007). Awareness is being spread among people in remote areas regarding the fact that if there is no security guard or any short receipts from ATM, customers should report and inform call center or to card issuing bank (Murali and Murali, 2007). Khanna (2007) stated about changing people mindset towards the trust(safety) on machines as well as bank staff like counting notes in absence (Manoharan, 2007).

Durkin et al. (2008) surveyed the simplicity of products through the adoption of internet banking facilities, customers' response on e-services adoption in Malaysia. Findings showed that quality is an essential consideration affecting adoption of IB.

Murali *et al.* (2008) did the evaluation of customer views or response on the quality of IB or e-banking as well as its adoption. To increase the number of users of IB the bank should be aware of factors that influence the customer decision whether they are the users or non-users, both have different expectations towards e-services technology.

Loonam and O'Loughlin (2008) examined the customer perception for e-banking services of IB in Ireland. The survey conducted among 20 customers resulted in predicting the (relative) importance of online experiences as well as three web gratifications (information search, transactions, and enjoyment). Online marketing campaigns that give rise to more website response affected the embracing of e-banking. Moreover, penetration of online banking further depends on campaigns (online marketing)

Lee and Chung (2009) studied the factors in Korea which significantly affect the customer's satisfaction towards MB adoption and their trust towards MB. In case of factors study, modified Delon and McLean's model was used, and the quality factors were analyzed. After examining different factors, the three respective factors, i.e., interface design quality, information superiority and quality of the system were considered important for the MB adoption. 276 customers were analyzed by using structural equating modeling approach. The factors i.e., trust and satisfaction influenced the customers' views whereas the factor i.e.,

interface design quality didn't have any effect on the same.

Yuan *et al*. (2010) examined the growth of IB and the history of IB in China. Though the IB stage in China is in developing or beginning stage but it is said to possess considerable number of potential customers. Business related transactions using IB were more found in China that were mostly used by young age generation, highly educated people as well as by wealthy class.

Molla Asrat (2017) This study looked at the variables influencing customers' decision to use the ATM banking system in the Addis Abeba banking sector in Ethiopia. The study used a mixed research approach. It used secondary data as well as primary data from 385 respondents. Attitude and Subjective norm were two main factors for adoption of ATM.

Patel, K.J. et.al (2018) The paper was an attempt to study the variables of IB adoption in the Gujarat State. The TAM model used in research revealed that perceived security is the main element behind the aim to use IB, followed by apparent usefulness and convenience to use.

Phothikitti (2020) The main aim of the study was to decide the main factors which. determines the utilization of cardless ATMs by the customers. SEM and CFA were employed in the study to assess the model's validity. It concluded that the amount of information, perceived utility, and convenience of usage significantly affect users' intentions to use cardless ATMs.

JUSTIFICATION AND OBJECTIVE OF THE STUDY

The infusion of technology with banking channels has empowered customers to perform banking operations quicker, more convenient, confidential, secured, and reliable banking with

access to tons of features just with the pleasant touch of an icon on the customer's own mobile device. User-friendly apps and internet banking fulfill various needs of customers. The ATMs are easily approachable, and customers are enjoying shopping with credit cards. The assessment of previous research revealed that most of them focused solely on the evaluation of single or isolated channels and the lack of research in the North India region. These studies have not considered the combined channel effect to evaluate the customers responses with respect to various banking self-service channels and their adoption by the banking customers in the Chandigarh region. In light of these gaps, the current study is an attempt to evaluate and identify significantly important factors with respect to multiple banking self-service technology avenues corresponding to mobile banking, credit cards, ATMs, and Internet banking. The expected outcome and recommendations of the study are expected to be beneficial for the banking service because it provides a way to better understand the customers and better align their service channels, eventually resulting in customer satisfaction and loyalty.

RESEARCH METHOOLOGY

The study used a pre-tested and structured questionnaire for collecting the relevant data. The study conducted a pilot survey in four regions of Chandigarh, such as the North, East, South, and Western parts. During the pilot survey, researchers found a response rate of 70 percent. Around 800 questionnaires were distributed, and 740 were returned by the respondents. After final scrutiny, 686 questionnaires that were complete in all respects were selected, and researchers evaluated these responses to fulfill the aim of this survey. The study used convenience and judgment sampling methods for data collection purposes. It evaluated the data with Cronbach alpha, Scree Plot, and Exploratory Factor Analysis.
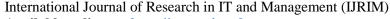
ANALYSIS & DISCUSSION:

Bartlett's Test of Sphericity and KMO Measure of Sampling Adequacy

Factor analysis is applied to lower the large statements into a lesser number of better manageable components. Kaiser-Meyer-Oklin's measurement of sample adequacy and the Bartlett's test for sphericity were used to validate the application of this technique.

KMO value (.813) in Table 1 indicates that the size of sample is enough for purpose of application of the factor analysis technique. Bartlett's test of sphericity demonstrated that correlation between the scale items is significant. Consequently, the KMO tests output as well as the bartlett's test suggested that factor analysis technique is proper for further analysis of the data. The Cronbach alpha value calculated as 0.916 for the overall Cronbach alpha is significant. These results imply significant correlation and internal consistency between the items.

Table 1 : KMO Measure of Sample Adequacy & Bartlett's Test of Sphericity for dimensions of factors affecting banking Self-Service Technology channels.

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.813
Bartlett's Test of Sphericity	Approx. Chi-Square	25428.251
	Df	1225
	Sig.	0.000**
Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	No. of Items
.916	.916	50

Source: Primary Data (SPSS 21 Version) (**= Significance at 0.001, *= Significance at 0.05)

Factor Analysis

Factor analysis is a method and procedure that is used for data reduction. During this application, factor analysis identifies some underlying dimensions that represent correlation among similar variables, known as factors. Factor analysis first reduces the data and secondly identifies the underlying dimensions. Table 2 exhibits total variance explained retrieved from results of application of Principal Component Analysis and extraction of dimensions of factors affecting self-service technology channels provided by the bank.

Table 2: Extraction of dimensions of factors affecting Self-Service Technology Channels provided by Banks.

Total Variance Explained			
	Initial Eigenvalues	Extraction Sums of Squared Loadings	Rotation Sums of Squared Loadings

Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	10.3	20.661	20.661	10.33	20.661	20.661	5.954	11.909	11.90
2	5.55	11.1	31.761	5.55	11.1	31.761	5.483	10.965	22.87
3	3.77	7.537	39.298	3.76	7.537	39.298	5.029	10.059	32.93
4	3.46	6.924	46.222	3.46	6.924	46.222	3.858	7.71	40.64
5	3.05	6.106	52.328	3.05	6.106	52.328	3.653	7.30	47.95
6	2.77	5.543	57.871	2.77	5.543	57.871	3.161	6.32	54.27
7	2.27	4.542	62.413	2.27	4.542	62.413	2.724	5.44	59.72
8	1.37	2.747	65.16	1.37	2.747	65.16	2.718	5.43	65.16
9	0.98	1.966	67.127						
10	0.89	1.778	68.905						
11	0.84	1.674	70.579						
12	0.78	1.566	72.144						
13	0.75	1.508	73.652						
14	0.73	1.468	75.12						
15	0.7	1.395	76.515						
16	0.67	1.336	77.852						
17	0.63	1.259	79.111						
18	0.61	1.214	80.325						
19	0.58	1.151	81.476						
20	0.56	1.114	82.59						
21	0.54	1.082	83.672						
22	0.52	1.045	84.717						
23	0.48	0.968	85.685						
24	0.48	0.952	86.638						
25	0.47	0.938	87.576						
26	0.44	0.879	88.455						
27	0.44	0.871	89.326						
28	0.41	0.82	90.146						
29	0.4	0.807	90.953						
30	0.39	0.772	91.725						
31	0.35	0.708	92.433						
32	0.34	0.675	93.109						
33	0.33	0.659	93.768						
34	0.31	0.612	94.379						
35	0.3	0.593	94.972						
36	0.29	0.586	95.558						

37	0.27	0.544	96.103						
38	0.26	0.511	96.613						
39	0.25	0.493	97.106						
40	0.24	0.476	97.582						
41	0.22	0.444	98.026						
42	0.2	0.406	98.432						
43	0.19	0.383	98.815						
44	0.17	0.343	99.158						
45	0.16	0.315	99.473						
46	0.11	0.211	99.684						
47	0.05	0.105	99.789						
48	0.05	0.095	99.883						
49	0.04	0.069	99.953						
50	0.02	0.047	100						
Extraction Method: Principal Component Analysis									

Source: Primary Data (SPSS 21 version)

Table 2 presents the factor solution for fifty distinct statements that measure dimensions connected to various metrics of variables that influence the banking Self-Service Technology channels. In rotation component matrix, the study included only those factors which have Eigen values of more than 1, and these finally ends into eight factor solutions. Analysis of table revealed component 1 as most important with explained variance 11.909%. The values of explained variances are 10.965%, 10.059%, 7.715%, for the components 2,3, and 4 respectively. These explained variances are 7.306%, 6.323%, 5.447%, and 5.436% for the components 5,6,7 and 8 respectively. So, these eight factor solutions jointly accounted for 65.16 percent of total variance. Fig 1 presents the scree plot of factors affecting banking Self-Service Technology channels.
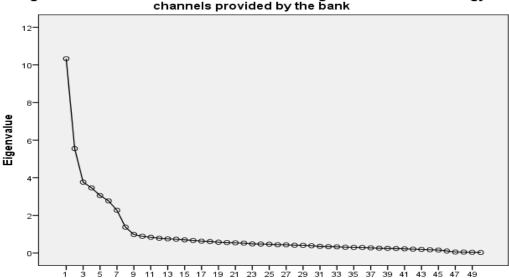
Fig 1: Scree Plot of Extraction of factors affecting Self-Service Technology channels provided by the bank

Rotated Component Matrix with Profiling of dimensions associated with factors affecting Self-Service Technology channels provided by Banks

Table 3 shows the results of the Rotated Component Matrix with profiling of dimensions associated with factors affecting Self-Service Technology channels provided by Banks.

Table 3: Rotated Component Matrix with Profiling of dimensions associated with factors affecting Banking SST channels

Factor	Statement	Factor Loading	Reliability (Cronbach Alpha)	Naming of The Factor
Factor 1	It is faster	0.844	0.884	Technology Transition
	It saves our valuable time and energy	0.842		
	It helps to perform inter-branch transactions with ease	0.818		
	It has provided customers a wider reach than before	0.803		
	It is neat and accurate	0.783		
	It has reduced dependence on facilities like DD/MT	0.773		
	It is cost-wise cheaper	0.735		
	Banks are moving towards global standards	0.734		
	It has transformed a branch customer into a bank customer	0.73		

Factor 2	To conduct my banking transactions with ease and Speed	0.825	0.878	**Mobile Banking Usage**
	To give me greater control on banking activities	0.803		
	To increase the quality of decisions.	0.794		
	As it would require less effort with Mobile Device (MD)	0.793		
	To update and understand my banking details clearly	0.791		
	As I can cope up with difficulties, if any, with my MD	0.788		
	As I believe that MB providers are honest and Trustworthy	0.749		
	To satisfy my well-wishers and pose me as tech-savvy	0.728		
Factor 3	Banks do not charge for net banking facility	0.898	0.928	**Internet banking Adoption**
	Net Banking is attractive mainly for cost reasons	0.889		
	Requires less effort to do transactions online	0.861		
	Net banking fulfils customer needs	0.855		
	Banking operations can be done at free time.	0.837		
	It is user friendly	0.827		
	Banking transactions are highly secured	0.622		
Factor 4	Fake notes inclusion cannot be surrendered immediately	0.845	0.897	**ATM Services**
	Options are available to choose currency denominations	0.844		
	ATMs have help line to contact during emergency	0.832		
	ATMs do not go dry (without cash)	0.797		
	ATMs have Cash / Cheques deposit facility	0.709		
	Grievance is addressed immediately	0.641		
Factor 5	Confidentiality	0.848	**0.909**	**Customer Satisfaction for SSTs**
	Connectivity	0.846		
	Affordability	0.687		
	Convenience	0.646		

	Compatibility	0.625		
	Reliability	0.612		
Factor 6	Promote friends and blood relations to do banking.	0.845	**0.912**	**Customer Loyalty**
	Favor this Bank a great deal more than any Other	0.844		
	Want to maintain my business relationship with Bank	0.783		
	Consider Bank to be my principal financial institution	0.721		
	Satisfied with the financial services provided as well as the personnel at the bank personnel at the bank	0.696		
Factor 7	It should be convenient	0.745	**0.835**	**Self-Service Technologies (SSTs) Services**
	It should suit my needs (compatible)	0.722		
	The services provided should be accurate	0.697		
	It should be highly confidential	0.696		
	It should be affordable	0.689		
Factor 8	The risk involved in carrying cash is averted	0.818	**0.899**	**Credit Card Acceptance**
	The prestige in possessing the card	0.759		
	The procedure for obtaining a new card is simple	0.747		
	The waiting at banks for simple banking needs is saved	0.745		

*Extraction Method: *Principal Component Analysis*.

FINDINGS & DISCUSSION: The Exploration of Table 3 exhibits that application of factor analysis resulted in eight factor solutions. The study has identified eight factors which are cited as, technology transition, mobile banking usage, internet banking adoption, ATM services, SSTs acceptance, customer satisfaction, customer loyalty and credit card acceptance. Internal consistency for each extracted factor was calculated using Cronbach's alpha and its values for the extracted dimensions ranged from 0.878 to 0.928, indicating that scale fulfils the criteria of internal consistency (Hair, et. al., 2009).

1) **Technology Transition**: The first factor which is extracted is named as technology transition and consists of nine statements. The items in the factor are measuring the reliability of SSTs and believe that the advanced technologies are faster in nature, saves time and

energy, helps in performing inter-banking transactions with ease and accuracy and has reduced the dependency of demand drafts (DD also incurs extra cost of some amount) and do not have any charges to use the banking services. Moreover, customers believed that technology adoption and transition has matched with global standards and transformed the bank from branch customer to bank customers. Banks have given them the liberty to exercise their facilities with single click only. The factor loading of the nine mentioned items range from .844 to .730, which signifies that these items are significantly loaded on the technology transition.

2) Mobile Banking Usage: The second factor named as mobile banking usage was extracted with the help of factor analysis to the study the perceptions of customers towards mobile banking. The eight variables such as conducting financial transactions with ease and comfort, to have greater control over banking services, can check balance, transfer amount, and receive amount anytime and confirm the same at a time, need less efforts and banking transactions can be clearly seen in the statement and provide more security to perform banking activities. Customers believe that mobile banking has improved their status and they feel like tech-savvy privileged customers, are measuring mobile banking usage construct. The factor loading of the eight items is calculated between 0.825 to 0.728 for all the items, indicating that all the items have significantly loaded on mobile banking usage.

3) Internet Banking Adoption: This third construct internet banking adoption, is designed to improve the brand image of banks with tis internet facilities. The construct includes seven statements which are as no charges for using internet services, saves their time and fuel thus is cost effective, need less efforts, fulfil all the needs of customers, is more of user friendly and are highly secured as login password, OTP generation, transaction id password makes it more secure and reliable. The value of factor loading of items varying from 0.898 to 0.622 and are significantly associated with the same construct.

4) ATM Services: ATM services the fourth construct and is assessed with the help of six items named no fake notes during withdrawal from ATM machines, availably of help lines during emergency, say positive things about banks, provision of security guard to assist and protect people while withdrawing money from ATM machines. The value of factor loading of these items is from .845 to .641, represents that all items are significantly assigned to ATM

services' factor.

5) Customer Satisfaction: The fifth construct named customer satisfaction is extracted and is measured through six items such as confidentiality, connectivity, affordability, convenience, compatibility, and reliability of banks to handle their queries, disputes, and financial settlements. The factor loading of these six items is from 0.848 to 0.612, this reports that all the items are significantly allocated customer satisfaction.

6) Customer Loyalty: The next factor is customer loyalty representing the reasons and belief of bank customer for longer association with banks. This is calculated with the help of five items represents as primary banks for all financial settlements, recommend friends to change to their preferred banks for all the banking activities, have shown their willingness to continue their transactions with the same bank and satisfied with behaviour of staff and bank services. The factor loading of items ranges from 0.845 to 0.696, indicating significant allocation of items to its respective factor.

7) Self-Service Technologies Services: The seventh factor is SSTs adoption and customers have found it more convenient to perform, suitable for fulfilling their needs, accuracy, affordability, and privacy features encourages the customers to use SSTs for their daily purpose. This factor consists of five items and the value of factor loading ranges from 0.745 to 0.689.

8) Credit Card Acceptance: The last factor is credit card acceptance consists of four items, whose values ranges from 0.818 to 0.745. The four items signify that to avert the risk of stolen cash, misplacing cash can be reduced with credit card usage, the easy procedure to obtain the card and time saving and they feel proud in carrying the credit card. In nutshell, it can be concluded that adoption of SSTs in any form has changed the shape of banking industry in India and worldwide. People are enjoying the advanced version of SSTs and have shown their willingness to use the same in f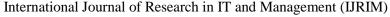uture. The four services (ATM, Internet banking, Mobile banking, and Credit card) along with other four factors have been identified to infer more results. Overall, customers have shown their positive response and attitude towards the acceptance and adoption of SSTs.

CONCLUSION & SUGGESTIONS

The study observes that technology transition, mobile banking usage, internet banking

adoption, ATM services, customer satisfaction and customer loyalty. SSTs are valued by consumers due to convenience, affordable, easy to use, and secure. It is found that advanced customer-friendly technical features and customer satisfaction have direct associations with each other. Moreover, customers may now conduct banking transactions effectively and independently by the application of SSTs, which reduces the dependency on conventional branch-based services. Customers are continuously demonstrating an inclination to adopt these advances and innovation in these technologies, which is good for the future of SSTs. To enhance SST usage, service providers should focus on enhancing security features, guaranteeing user-friendly interfaces, and broadening the scope of services. Continuous customer support and education by banks can boost trust in SST channels. Customer loyalty and satisfaction may be further increased by providing smooth, efficient, and reliable service.

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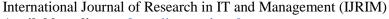
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