Measuring and Comparing the Components of Technology Readiness Index for Adoption of Cashless Transaction in Mumbai – A Quantitative study of Select Demographic Variables

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Abstract: Adoption of cashless transaction by society fosters transparency, inclusiveness and host of other documented benefit. For a developing country like India this will usher in, an unimagined metamorphosis. However migration from cash to cashless would not be frictionless and as with any change this change would also be resisted. The resistance to any change has a demographic and a psychographic undercurrent. Unraveling the demographic and psychographic undercurrent would be a prerequisite for any intervention to accelerate the adoption of cashless transaction. A survey was administered using structured questionnaire designed by using the constructs of Technology Readiness Index. 1249 responses were analyzed for assessing the difference of the distribution of the score of various constructs across age and gender. Post analysis it is seen that the distribution of score of all constructs were not same for the demographic variable gender and in some cases for the age variable. Pursuant to the finding it can be suggested that a universal intervention program to boost cashless transaction would fall short in achieving the goal. Intervention should be configured as per demographic grouping variable and primacy to gender should be given.

IndexTerms Technology Readiness Index, Innovativeness, Discomfort, Optimism, Insecurity, Kruskall Wallis, Mann Whitney U test.

I. INTRODUCTION

There is documented evidence that electronic payment (e-payment) development will strongly contribute to improving countries' competitiveness in many ways (Kamulegeya 2010). Innovations in the payment industry have also led to greater financial inclusion. The World Bank has also suggested that e-payment is crucial for economic development. In its report entitled 'The Opportunities of Digitizing Payments', it states that rapidly developing and extending digital platforms including e-payment can provide all the means to increase financial inclusion at the desired scale. E-payment is able to do this by providing the increased speed, security, transparency, and cost efficiencies (World Bank 2014b).

By moving toward digital payment systems we would significantly lessen the socioeconomic cost of upholding the payment structure of today (Arvidsson, 2009). Using calculations from Arvidsson, it can be safely assumed that a move towards a cashless society would decrease the costs by 1% of the gross domestic product (GDP) of a given country (Flaatraker & Robinsson, 1995; Humphrey, Willesson, Bergendahl, & Lindblom, 2006).

A recent priority of the Indian government is to move from traditional paper currency based journey to a cashless transaction. Use of e-delivery channels can strengthen such initiatives and reduce illegal transaction as well as eliminate the problem of black money. Each year the government spends crores of rupees in printing notes, storage as well as transportation of currency notes. E-banking concept is seen as a strategic mechanism to reduce such major spending by the government and the banks.

However, the extent of readiness to accept this mechanism by customers is a major concern for banking authorities. Taking into account all the rural and urban customers, technological innovation such as e-banking penetration has a long way to go before it becomes an envisioned reality. At present merely 7 percent (as in 2011) of Indian bank customers are using the internet banking, a service delivery channel of e-banking. However as per reports of IDC e-banking service delivery like mobile banking users can shoot up immediately to surpass other online banking service deliverables and boost cashless transaction. With more number of mobile subscribers growing in household, mobile banking can be at the forefront to avail technological innovations like e-banking services.

II. Literature review

Consumers are increasingly sophisticated with use of self service technology but not everyone readily embraces technology-assisted services (Lin and Hsieh, 2006; Zeithaml et al., 2002). Individual characteristics determine a person's adoption of technology; the propensity to embrace and use new technologies for accomplishing goals at home and work is labeled technology readiness (TR) by Parasuraman (2000). A person's predisposition to use new technologies, as expressed in TR, is a state of mind resulting from a collection of mental enablers and inhibitors. Parasuraman (2000) developed TRI scale that includes four dimensions: optimism, innovativeness, discomfort, and insecurity. The positive drivers (optimism and innovativeness) encourage people to use technological products/services and hold positive attitudes toward technology. The negative drivers (discomfort and insecurity) inhibit people's adoption of technology

In assessing the individual's e-readiness, most studies adopt Parasuraman's multiple-item scale TRI (technology Readiness Index) model. According to Parasuraman (2000), the technology-readiness construct refers to 'people's propensity to embrace and use new technologies for accomplishing goals in home life and at work'. Figure 1 below illustrates the TRI assessment model as proposed by Parasuraman (2000) and adopted by most literature relating to the subject matter.

Positive and negative beliefs about technology may coexist, and people can be arrayed along a technology-belief continuum with a strongly positive attitude at one end and a strongly negative attitude at the other. Parasuraman (2000) empirically confirms the correlation between people's technology readiness and their propensity to employ technology. In Walczuch et al. (2007) study, a person with high optimism and innovativeness and little discomfort and insecurity was more likely to use a new technology.

To measure a person's general beliefs and thoughts towards a technology, the approach used was Technology Readiness Index. TRI was chosen since it could differentiate whether a person was a technology user or not. It also could group users based on positive and negative beliefs to the technology in more complex way. Parasuraman identifies that someone who is optimistic and innovative as well as has lesser discomfort and insecurity felling will be more ready to use new technology, they are Optimism, Innovativeness, Discomfort and Insecurity. The construct is multifaceted, comprising four dimensions:

- Optimism - a positive view of technology and a belief that it offers people increased control, flexibility, and efficiency in their lives.
- Innovativeness - a tendency to be a technology pioneer and thought leader.
- Discomfort - a perceived lack of control over technology and a feeling of being overwhelmed by it.
- Insecurity - distrust of technology, stemming from skepticism about its ability to work properly and concerns about its potential harmful consequences.

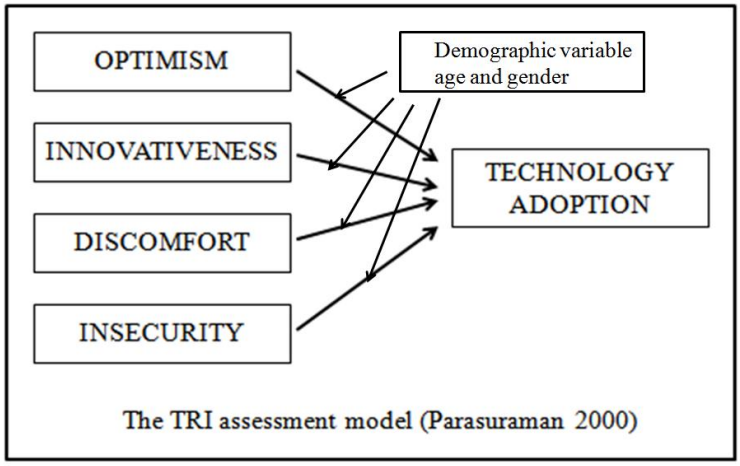

Figure 1

Previous studies have indicated that individual differences are important external factors that play a crucial role in any technological innovation's implementation across a wide range of fields (Wang et al. 2003). These studies also investigate the influence of individual or consumer traits (e.g., demographic factors, psychographic profiles, and personality traits) on technology acceptance models (Agarwal & Prasad 1998; Dabholkar & Bagozzi 2002; Yi et al. 2006). Variation in consumer differences arising from personality traits might be more important than demographic factors because such variation is significantly affects consumers' attitude formation and behavioural intentions (Dabholkar & Bagozzi 2002). Focusing on how these personality traits impacted on the tendency to use technology was imperative (Yi et al. 2006). Therefore, when assessing consumers' perception of, behaviour towards, and tendency to adopt new technologies, researchers should also take into account consumers' personality traits (Parasuraman 2000; Lin & Hsieh 2006; Lin et al. 2007). Personality trait is connected with demographic correlates (Lewis R. Goldberg, 1998). Hence comparison of measured trait amongst various categories of demographic variable is useful.

To study technology readiness at the consumer level, many studies have used Parasuraman's (2000) multiple-items scale technology readiness index (TRI). Most empirical studies that have adopted Parasuraman's (2000) TRI model focus on:

- Examining the effects of technology readiness on the adoption of self-service technologies (SSTs) (e.g. Liljander et al. 2006; Lin & Hsieh 2007; Rose & Fogarty 2010; Lin & Chang 2011), and
- Investigating the relationship between technology readiness and consumers' demographics and behaviour (e.g., Yi et al. 2003; Nikos 2004; Lin et al. 2007; Walczuch et al. 2007; Lam et al. 2008).

Interestingly, some of these studies integrate TRI and the TAM into one model to study how consumers adopt new technologies (e.g. Yi et al. 2003; Lin et al. 2007; Walczuch et al. 2007; Lin & Chang 2011). These studies specifically measure the relationship between TRI's personality trait dimensions and the TAM's cognitive dimensions.

Yi et al. (2003) address Baron and Kenny's (1986) question "What processes link traits to behaviour?" They found that two TR dimensions (innovativeness and optimism) interacted with perceived usefulness to determine people's intention to accept new technologies. The brief description of the research is given in the table1

Empirical studies on technology readiness by consumers	
Agarwal & Prasad 1998; Dabholkar & Bagozzi 2002; Yi et al. 2006	These studies investigate the influence of individual or consumer traits on technology acceptance models which includes individual differences (demographic factors, psychographic profiles, situational variables, and personality traits e.g. inherent novelty seeking, self-efficacy with technology, self-consciousness), perceptions (perceived ease of use, perceived usefulness), and technology usage behaviour.
Parasuraman 2000; Lin & Hsieh 2006; Lin et al. 2007	These studies conclude that when assessing consumers' perception of, behaviour towards, and tendency to adopt new technologies, researchers should also take into account consumers' personality traits.
Liljander et al. 2006; Lin & Hsieh 2007; Rose & Fogarty 2010; Lin & Chang 2011	These studies focus on examining the effects of technology readiness on the adoption of self-service technologies. Results indicate that customer's technology readiness enhances perceived usefulness, perceived ease of use, attitude toward use, and intention to use new technologies. The four technology readiness dimensions (optimism, innovativeness, discomfort and insecurity) were also replicated and validated.
Yi et al. 2003; Nikos 2004; Lin et al. 2007; Walczuch et al. 2007; Lam et al. 2008; Lin & Chang 2011	These studies integrate TRI and the TAM into one model to study how consumers adopt new technologies. The analysis results revealed that TRI's personality traits (optimism, innovativeness, discomfort and insecurity) had impact on TAM's cognitive dimensions or user perceptions (perceived ease of use and perceived usefulness)

Table 1

III. Objective

Innovativeness, Optimism, Discomfort and Insecurity along with perceived ease of use and perceived usefulness drive cashless transaction universally. High innovativeness and optimism and low discomfort and low insecurity would be ideal for a cashless technology adoption. These variables are affected by the demographic profile of the respondents. The objective of the investigation is to compare the scores of various constructs of the Technology Readiness Index across demographic variable of age and gender.

IV. Hypothesis testing

- The distribution of innovativeness is same across all categories of demographical variable age and gender
- The distribution of optimism is same across all categories of demographical variable age and gender
- The distribution of discomfort is same across all categories of demographical variable age and gender
- The distribution of insecurity is same across all categories of demographical age and gender

V. Research methodology

Sampling Thirty three items were used in developing the questionnaire and these forty three items collectively measure four constructs named as innovativeness, Optimism, discomfort and Insecurity inherent in the respondents psyche. Using the thumb rule of twenty five observation per variable (1:25) the sample size comes to 825(33 x 25). The sampling technique is convenience sampling. Data was collected by constructing questions on Google forms and administering the question through Email, and Whatsapp. To circumvent the problem of low incidence rate questionnaire was sent to more number of individuals. The total sample size thereafter came to 1249.

Instrument The items question has been taken from studies done by Parasuraman (2000); Yi et al. (2003); Liljander (2006); Lin & Hsieh (2007); Walczuch et al. (2007); Lam et al. (2008) Reliability of the questionnaire was done using Cronbachs Alfa. All values are above the threshold of 0.7 indicating a satisfactory reliability.

Construct name	No of items	Cronbachs Alfa
Innovativeness of Individual	7	0.781
Optimism of Individual	10	0.867
Discomfort of Individual	9	0.778
Insecurity of an individual	8	0.793

Table 2

Data analysis

The entire data analysis is divided into three parts

1. Calculating the Average score of the constructs.
2. Normality testing of all the constructs
3. Hypothesis testing for comparing scores across age and gender groups

In the first part the average score of all the four constructs was computed. In the second stage Normality testing was done of the entire new averaged variable. The data was not normally distributed. Thereafter comparison of the means of the averaged variable was done across the demographic grouping of age and gender using Mann Whitney U test and Krusskal wallis test.

VI. Conclusion and Recommendation

Sr no	Null Hypothesis	Age	Gender
1	The distribution of innovativeness is same across all categories of Demographical variable*	Reject /0.004	Reject /0.000
2	The distribution of optimism is same across all categories of Demographical variable*	Retain/0.088	Reject /0.001
3	The distribution of discomfort is same across all categories of Demographical variable*	Retain/0.939	Reject /0.036
4	The distribution of insecurity is same across all categories of Demographical variable*	Retain/0.709	Reject /0.021

Table 3

Gender as a demographical variable helps discriminating well on constructs of innovativeness optimism discomfort and insecurity. If the demographic variable age is taken for consideration baring Innovativeness there is no difference amongst age groups on the constructs of Optimism discomfort and Insecurity. The Technology readiness index along with interaction with other variables like perceived ease of use and perceived benefit of use lead to adoption of cashless transaction. As a decision maker any planning should take into account the demographic variable before implementing the action plan.

VII. References

- Agarwal, R & Prasad, J 1998, 'A Conceptual and Operational Definition of Personal Innovativeness in the Domain of Information Technology', Information Systems Research, vol. 9, no. 2, pp. 204-15
- Arvidsson, N. (2009). Framtidens Betalsystem Senior Researcher at KTH
- Dabholkar, PA & Bagozzi, RP 2002, 'An Attitudinal Model of Technology-Based SelfService: Moderating Effects of Consumer Traits and Situational Factors', Journal of the Academy of Marketing Science, vol. 30 no. 3, pp. 184-201.
- Flaatraker, D. I., & Robinsson, P. E. (1995). Income, costs, and pricing in the payment system. Norges Bank Economic Bulletin (66).

- Goldberg LR, Sweeney D, Merenda PF, Hughes JE. Demographic variables and perssonality: The effects of gender, age, education, and ethnic/racial status on self-descriptions of personality attributes Personality and Individual Differences. 24: 393-403.
- Humphrey, D., Willesson, M., Bergendahl, G., & Lindblom, T. (2006). Benefits from a changing payment technology in European banking. Journal of Banking and Finance, 30(6): . 1631–1652.
- Kamulegeya, F 2010, 'E-Payment Will Improve Country's Competitiveness', Sunday Monitor.
- Lam, SY, Chiang, JW & Parasuraman, A 2008, 'The Effects of the Dimensions of Technology Readiness on Technology Acceptance: An Empirical Analysis', Journal of Interactive Marketing, vol. 22, no. 4, pp. 19-39.
- Liljander, V, Gillberg, F, Gummerus, J & van Riel, A 2006, 'Technology Readiness and the Evaluation and Adoption of Self-Service Technologies', Journal of Retailing and Consumer Services, vol. 13, no. 3, pp. 177-91.
- Lin, J.C. and Hsieh, P.L. (2005), "Assessing self-service technology encounters: development and validation of SSTQUAL scale", paper presented at Taiwan Institute of Marketing Science Annual Conference, Taipei, Taiwan.
- Lin, J-SC & Chang, H-C 2011, 'The Role of Technology Readiness in Self-Service Technology Acceptance', Managing Service Quality, vol. 21, no. 4, pp. 424-44.
- Lin, J-SC & Hsieh, P-L 2007, 'The Influence of Technology Readiness on Satisfaction and Behavioral Intentions Toward Self-Service Technologies', Computers in Human Behavior, vol. 23, no. 3, pp. 1597-615.
- Nikos, T 2004, 'A Technology Readiness-Based Taxonomy of Customers: A Replication and Extension', Journal of Service Research, no. August, pp. 42-52.
- Parasuraman, A. and Grewal, D. (2000), "The impact of technology on the quality-value-loyalty chain: a research agenda", Journal of the Academy of Marketing Science, Vol. 28 No. 1, pp. 168-74.
- Rose, J & Fogarty, G 2010, 'Technology Readiness and Segmentation Profile of Mature Consumers', in Academy of World Business, Marketing & Management Development, vol. 4, pp. 57-65.
- Walczuch, R, Lemmink, J & Streukens, S 2007, 'The Effect of Service Employees' Technology Readiness on Technology Acceptance', Information & Management, vol. 44, no. 2, pp. 206-15.
- Yi, Y, Tung, LL & Wu, Z 2003, 'Incorporating Technology Readiness (TR) Into TAM: Are Individual Traits Important to Understand Technology Acceptance?', in Diffusion Interest Group in Information Technology (DIGIT), Seattle.
- Yi, Y, Wu, Z & Tung, LL 2006, 'How Individual Differences Influence Technology Usage Behavior? Toward An Integrated Framework', Journal of Computer Information Systems, vol. 46, no. 2, pp. 52-63.
- Zeithaml, V.A., Parasuraman, A. and Malhotra, A. (2002), "Service quality delivery through web sites: a critical review of extant knowledge", Journal of the Academy of Marketing Science, Vol. 30 No. 4, pp. 362-76.

VIII. Annexure

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
COMPUTE innv= (Inn1+Inn2+Inn3+Inn4+Inn5+Inn6)/6	.075	1249	.000	.970	1249	.000
COMPUTE opt= (Opt1+Opt2+Opt3+Opt4+Opt5+Opt6+Opt7+Opt8+Opt9+Opt10)/10	.076	1249	.000	.944	1249	.000
COMPUTE disc= (Disc1+Disc2+Disc3+Disc4+Disc6+Disc7+Disc8+Disc9+Disc10)/9	.070	1249	.000	.975	1249	.000
COMPUTE ins= (Ins1+Ins2+Ins3+Ins4+Ins5+Ins6+Ins7+ins8)/8	.060	1249	.000	.980	1249	.000

a. Lilliefors Significance Correction

Annexure 1- Normality testing

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of COMPUTE innv= (Inn1+Inn2+Inn3+Inn4+Inn5+Inn6)/6 is the same across categories of Age.	Independent-Samples Kruskal-Wallis Test	.004	Reject the null hypothesis.
2	The distribution of COMPUTE opt= (Opt1+Opt2+Opt3+Opt4+Opt5+Opt6+Opt7+Opt8+Opt9+Opt10)/10 is the same across categories of Age.	Independent-Samples Kruskal-Wallis Test	.088	Retain the null hypothesis.
3	The distribution of COMPUTE disc= (Disc1+Disc2+Disc3+Disc4+Disc6+Disc7+Disc8+Disc9+Disc10)/9 is the same across categories of Age.	Independent-Samples Kruskal-Wallis Test	.939	Retain the null hypothesis.
4	The distribution of COMPUTE ins= (Ins1+Ins2+Ins3+Ins4+Ins5+Ins6+Ins7+ins8)/8 is the same across categories of Age.	Independent-Samples Kruskal-Wallis Test	.708	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Annexure 2 Independent Kruskal Wallis Test – Age

Ranks

	Age	N	Mean Rank
COMPUTE innv= (Inn1+Inn2+Inn3+Inn4+Inn5+Inn6)/6	Less than 20 years	85	620.08
	Between 20 to 29 years	1030	634.69
	Between 30 to 39 years	70	649.10
	Between 40 to 49 years	34	485.91
	Between 50 to 59 years	25	409.10
	More Than 60 years	5	400.50
	Total	1249	
COMPUTE opt= (Opt1+Opt2+Opt3+Opt4+Opt5+Opt6+Opt7+Opt8+Opt9+Opt10)/10	Less than 20 years	85	606.96
	Between 20 to 29 years	1030	630.30
	Between 30 to 39 years	70	680.61
	Between 40 to 49 years	34	505.28
	Between 50 to 59 years	25	490.68
	More Than 60 years	5	546.40
	Total	1249	
COMPUTE disc= (Disc1+Disc2+Disc3+Disc4+Disc6+Disc7+Disc8+Disc9+Disc10)/9	Less than 20 years	85	661.46
	Between 20 to 29 years	1030	622.79
	Between 30 to 39 years	70	630.04
	Between 40 to 49 years	34	623.97
	Between 50 to 59 years	25	587.04
	More Than 60 years	5	587.20
	Total	1249	
COMPUTE ins= (Ins1+Ins2+Ins3+Ins4+Ins5+Ins6+Ins7+ins8)/8	Less than 20 years	85	626.72
	Between 20 to 29 years	1030	626.09
	Between 30 to 39 years	70	585.19
	Between 40 to 49 years	34	658.82
	Between 50 to 59 years	25	676.24
	More Than 60 years	5	443.20
	Total	1249	

Annexure 3 Independent Kruskall wallis test – Age

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of COMPUTE innv= (Inn1+Inn2+Inn3+Inn4+Inn5+Inn6)/6 is the same across categories of Gender.	Independent-Samples Mann-Whitney U Test	.000	Reject the null hypothesis.
2	The distribution of COMPUTE opt= (Opt1+Opt2+Opt3+Opt4+Opt5+Opt6+Opt7+Opt8+Opt9+Opt10)/10 is the same across categories of Gender.	Independent-Samples Mann-Whitney U Test	.001	Reject the null hypothesis.
3	The distribution of COMPUTE disc= (Disc1+Disc2+Disc3+Disc4+Disc6+Disc7+Disc8+Disc9+Disc10)/9 is the same across categories of Gender.	Independent-Samples Mann-Whitney U Test	.036	Reject the null hypothesis.
4	The distribution of COMPUTE ins= (Ins1+Ins2+Ins3+Ins4+Ins5+Ins6+Ins7+ins8)/8 is the same across categories of Gender.	Independent-Samples Mann-Whitney U Test	.021	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Annexure 4 Independent samples Mann-Whitney U test – Gender

Ranks

	Gender	N	Mean Rank	Sum of Ranks
COMPUTE innv= (Inn1+Inn2+Inn3+Inn4+Inn5+Inn6)/6	Male	725	697.85	505940.50
	Female	524	524.21	274684.50
	Total	1249		
COMPUTE opt= (Opt1+Opt2+Opt3+Opt4+Opt5+Opt6+Opt7+Opt8+Opt9+Opt10)/10	Male	725	654.52	474529.00
	Female	524	584.15	306096.00
	Total	1249		
COMPUTE disc= (Disc1+Disc2+Disc3+Disc4+Disc6+Disc7+Disc8+Disc9+Disc10)/9	Male	725	643.16	466290.00
	Female	524	599.88	314335.00
	Total	1249		
COMPUTE ins= (Ins1+Ins2+Ins3+Ins4+Ins5+Ins6+Ins7+ins8)/8	Male	725	644.98	467609.00
	Female	524	597.36	313016.00
	Total	1249		

Annexure 5 Independent samples Mann-Whitney U test – Gender