Research Procedure

In this chapter the research design and the procedures for conducting the study have been described. It defines the instrument development, pilot testing, sampling, data collection and data analysis procedures.

4.1 Instrument Development

As IT is an all encompassing term that includes hardware, software, communication, man and materials required to implement, for this study specifically Bank Branch Automation (Total Branch Automation, TBA) has been chosen as an example of IT application. This bank branch automation could be a result of implementation of TBA, TBA leading to core banking solution or direct core banking implementation.

A structured questionnaire was developed to collect data on the variables of this study with TBA as the technology on which the conceptual model would be tested. Based on the literature, some questions were adopted and compiled from previous studies of IT adoption and others were developed or modified specifically for this study. The measures used for testing the constructs were developed by the researcher as well as adopted from other sources that had been used in previous studies (Poku, 2003; Kamal, 2006; Sohal, 2000; Lee et al., 2005; Power, 2004; Lu et al., 2003, Kim and Galliers, 2004; Ndubisi and Jantan, 2003; Hsieh et al., 2006; Poon et al., 2005). The guidelines followed during the questionnaire design were based on the recommendations of Dillman (1978) and Churchill (1979). The type of questions ranged to include open ended,
dichotomous, multiple category closed ended and labelled scale response questions.

Part I of the instrument consisted of questions on organization profile covering bank type, respondent office hierarchy, geographical location, number of employees etc.

Part II covered questions on the technology orientation of the organization, role of technology and innovation in the organization, responsiveness, perceived flexibility in delivering service, stage of IT in the bank, integration of control systems, quality of deliverables with the help of technology, product innovation through the use of IT, technology as an organization practice, value creation by use of technology and role of technology in delivering low cost, flexible & efficient solutions.

Part III addressed the extent of IT application and covered questions on level of IT in the bank, IT’s role in cost cutting, IT’s role in decision making, its compatibility with existing systems, IT’s influence on speed of response to the customer and its linkage with productivity enhancement.

Part IV of the instrument consisted of questions on perceived effectiveness of IT adoption covering importance of IT for the organization, importance of IT for individual employee, value of IT in performing job, management support, level and quality of training, and usefulness of IT.

Part V addressed questions on the organization support variables and consisted of questions on internal technical support, top management support, IT experience at various levels, IT knowledge at various levels, IT in use, Planning for IT,
employees’ participation in decisions about IT and communication package for IT innovation.

Part VI covered the aspects of perceived ease of use by user through questions on ease of understanding and use, ease in finding new ways of doing one’s job, enjoyment in using IT, employees contributing constructively for improving IT as well as using IT to perform a better job.

Part VII covered questions on perceived usefulness by user by addressing use of IT in easier reconciliation, automatic ledger generation, providing in-depth information, increasing productivity, improving working relationship, enhancing job quality and coworkers promotion of IT.

Part VIII explores the influence of external factors on IT adoption by addressing questions on use of IT by partners and industry players, bank’s image, competitive pressures, governmental regulations and global trends and accords.

4.2 Pilot Testing

Pilot testing was conducted to validate the items and whole scale in the instrument. This was necessitated because some of the measurement items were modified or developed specifically for this research leading to compilation of some new questions.

A preliminary questionnaire was developed by amalgamating item pools from previous studies and distributed to five bank managers and five professors (two from Aligarh Muslim University, one eminent retired professor from Delhi University and two professors from Lingaya’s Institute of Management & Technology) to gain their feedback on the content, layout, wording and ease of
comprehension of measurement items. Their feedback for improvements on clarity, readability, content enhancement and layout were incorporated in the second stage of the instrument development.

A set of twenty bank branches was interviewed using the revised questionnaire. Verbal feedback was received and changes made accordingly. The pilot test results indicated a requirement of simplification of some words to cater to varied level of English language comprehension in India. The words flexibility and responsiveness were explained again with more clarity.

4.3 Sampling Procedures and Questionnaire Administration

The target population for this research was bank branch managers or equivalent, like divisional managers etc. of scheduled commercial banks. The total population of the bank branches of interest for the present study as per RBI website (web-link cited in bibliography) and Indian banks association turns out to be 54618 spread all over India. The banks that were not taken into account were scheduled cooperative banks, regional rural banks and other non-scheduled banks. The reason for such exclusion is on the basis of issues in governance under strict rules/supervision; and pertinent data inaccessibility.

This study has heavily relied upon the published data of RBI and web-links of Indian Banks Association and sample banks and their offices. In the multi-stage sampling design, in the first stage a list of bank names in the categories viz., Nationalized Public Sector bank, SBI, SBI Subsidiary, Old Private Sector bank, New Private Sector bank and Foreign banks was listed. In the second stage, a list of 4 banks each was selected on the purposive random sampling basis. At this
stage the number of bank branches of these short listed banks turned out to be 27135. This constituted nearly 49.7 percent of the total branches of the selected universe of scheduled commercial banks excluding regional rural banks. The bank branches list was then compiled from the websites and also by contacting the banks' offices. Further sampling was done using software called 'The Survey Systems' version 9.5. From this database of 27135 branches, 1200 branches were sampled out at 80 percent confidence interval.

The structured questionnaire was sent to 1200 branches through couriers and also through offices of IT division, DCM Ltd. as well as Sysnet Ltd., wherever their service locations matched with the locations in sample.

Total 243 responses were received back after an intensive follow-up with the help of company representatives wherever they were present. As per 'The Survey Systems', the distribution of sample means (sample size 243) can be said to be an unbiased estimate with 80 percent confidence level where the confidence interval ranges from 3.67 (80 percent level) to 7.39 (99 percent level). This signifies that we can be 80 percent sure that the true population percentage is ranging between 76.33 and 83.67.

4.4 Reliability and Validity of the Instrument

For some IT adoption factors, a modified version of a similar instrument which was developed by Computer Science and Telecommunications Board of National Research Council in 1991 and used by Poku (2003) was suitably adapted for IT adoption. Other items were adapted from the TAM by (Davis 1989; ~ et al. 1989). The organizational support and external factors adoption factors were
adapted from Kamal’s (2006) model for IT innovation adoption in the Government sector.

To draw valid inferences from the research, measures of all the variables are supposed to have validity and reliability (Cronbach, 1971; Nunnally, 1978).

Reliability is defined as the proportion of the variability in the responses to the survey that is the result of differences in the respondents and it concerns itself with how consistently similar measures produce similar results. The answers to a reliable survey will differ because respondents have different opinions, not because the survey is confusing or it has multiple interpretations.

Cronbach’s alpha is a measure of reliability. More specifically it is a lower bound for the true reliability of the survey. The computation of Cronbach’s alpha is based on the number of items on the survey and the ratio of the average inter-item covariance to the average item variance. Under the assumption that the item variances are all equal, this ratio simplifies to the average inter-item correlation, and the result is known as the Standardized item alpha (or Spearman-Brown stepped up reliability coefficient).

The widely accepted social science cut off for Cronbach’s alpha is that alpha should be 0.70 or higher for a set of items to be considered a scale (Hair et al., 1998). When alpha is 0.70, the standard error of measurement is over half (0.55) a standard deviation. Kehoe (1995) suggests that an alpha value of at least 0.50 should be achieved for accepting the items “as is” within a dimension, as long as they are within a short instrument.
There does not seem to be a consistent opinion on the value of Cronbach’s alpha for scale reliability. An alpha of 0.50 or above is considered by Bowling (1997) as an indication of good internal consistency, whereas an alpha of 0.70 or above is considered satisfactory by Howitt and Cramer (2003).

In this research, the multi item scales were checked for reliability by calculating Cronbach’s alpha, where the benchmark value of 0.50 or greater was considered acceptable.

The study has used seven tools to measure following variables and their Cronbach’s alpha is as given: Perceived effectiveness of IT adoption (.686), Organization Support (.830), Perceived Ease of Use (.739), Perceived Usefulness (.567), External Factors (.791), Technology Orientation (.512) and Extent of IT Application (.585).

The validity of a measurement instrument concerns how well it measures what it is supposed to measure (Rosental & Rosnow, 1984). In the present study the content validity of the measurement instrument was measured by requesting experts to scrutinize the questionnaire and provide feedback for revision. The panel consisted of five professors and five bank managers and they suggested changes to elucidate ambiguous statements as well as questions. In the pilot test each item was inspected for its clarity and relevance to the research.

Tukey’s test for additivity estimates the power to which items in a set would need to be raised in order to be additive. The statistics computed for ANOVA with Friedman’s test and Tukey’s test explains that the tools employed in the study between observations and between items are significant at 95 percent confidence.
interval. For “technology orientation” scale the test results indicate [Between Items additivity: Friedman’s $\chi^2 = 42.593 \ (0.00 \ast)$; ~ Non-additivity: Friedman’s $\chi^2 = 53.577 \ (0.00 \ast)$]. Hoteling T-squared distribution is of the form of MANCOVA/MANOVA, a multivariate test for equality of means among items in a dataset. The computed figure for the said scale is 1481.882 (0.00\ast).

For “extent of IT application” scale the test results indicate [Between Items additivity: Friedman’s $\chi^2 = 186.379 \ (0.00 \ast)$; ~ Non-additivity: Friedman’s $\chi^2 = 39.803 \ (0.00 \ast)$]. Hoteling T-squared distribution is of the form of MANCOVA/MANOVA, a multivariate test for equality of means among items in a dataset. The computed figure for the said scale is 2219.907 (0.00\ast).

For “perceived effectiveness of IT adoption” scale the test results indicate [Between Items additivity: Friedman’s $\chi^2 = .584 \ (0.811 \ast)$; ~ Non-additivity: Friedman’s $\chi^2 = 712.714 \ (0.00 \ast)$]. Hoteling T-squared distribution is of the form of MANCOVA/MANOVA, a multivariate test for equality of means among items in a dataset. The computed figure for the said scale is 11.853 (0.252\ast).

For “organization support” scale the test results indicate [Between Items additivity: Friedman’s $\chi^2 = 9.901 \ (0.00 \ast)$; ~ Non-additivity: Friedman’s $\chi^2 = 24.06 \ (0.00 \ast)$]. Hoteling T-squared distribution is of the form of MANCOVA/MANOVA, a multivariate test for equality of means among items in a dataset. The computed figure for the said scale is 100.903 (0.00\ast).

For “perceived ease of use” scale the test results indicate [Between Items additivity: Friedman’s $\chi^2 = 4.414 \ (0.00 \ast)$; ~ Non-additivity: Friedman’s $\chi^2 = 12.414 \ (0.00 \ast)$]. Hoteling T-squared distribution is of the form of
MANCOVA/MANOVA, a multivariate test for equality of means among items in a dataset. The computed figure for the said scale is 33.649 (0.00*).

For "perceived usefulness" scale the test results indicate [Between Items additivity: Friedman's $\chi^2 = 3.314$ (0.02*); ~ Non-additivity: Friedman's $\chi^2 = 167.381$ (0.00*)]. Hoteling T-squared distribution is of the form of MANCOVA/MANOVA, a multivariate test for equality of means among items in a dataset. The computed figure for the said scale is 108.011 (0.00*).

For the "external factors" scale the test results indicate [Between Items Additivity: Friedman's $\chi^2 = 11.930$ (0.00*); ~ Non-additivity: Friedman's $\chi^2 = 425$ (0.515*)]. Hoteling T-squared distribution is of the form of MANCOVA/MANOVA, a multivariate test for equality of means among items in a dataset. The computed figure for the said scale is 44.405 (0.00*).

Overall these tests signify that the tool used is valid at 80 percent confidence interval of population.

4.5 Data Analysis Procedure

The collected information/data using questionnaire was keyed into MS Excel. Further it was exported to SPSS (Statistical Package for Social Sciences) software, version 12 for Windows with compatible environment of data coding. Using SPSS analyze menu option, factor analysis, regression and multivariate statistical tools/techniques were deployed to analyse the quantitative aspect of the data. For qualitative data, univariate inferential summary statistics were used and the differences and similarities of ordinal and interval were used to measure various constructs. Graphical representations of the data such as charts, tables and other
figures were depicted wherever applicable. Descriptive analyses were used to emphasize the qualitative side of the research.

4.6 Limitations of the Study

This research study has several limitations, some of which are listed here. The sample of the study consisted of the managerial grade only and excludes all the others in hierarchy thus missing their perspective on IT adoption. The study also focused itself on only technology orientation and excludes other orientations. Banks like regional rural banks, cooperative banks and other non scheduled banks have not been included in the sample. This study also did not investigate differences between the measured variables with respect to respondent’s demographic characteristics. Only one IT application TBA was the subject of the study and there is no comparative analysis of different IT solutions in the banks. The study is also limited by the knowledge and skills of the researcher particularly in the statistical area.