CHAPTER 5
FINDINGS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the important findings of the study. The status of the extent of IT deployment in PSBs has been summarized. Findings of comparison of IT efficiency of public sector banks, comparison of performance of three categories of banks i.e. most efficient, moderately efficient and less efficient on each of the identified success factors and model of IT success have been discussed. Suggested actions and strategic implications have also been described. The chapter concludes with a brief discussion on significant research contribution and limitations of the study along with scope for future work.

The present study has been carried out with the following objectives:

(i) To study the extent of IT deployment in public sector banks of India.
(ii) To compare the efficiency of public sector banks with respect to information technology deployment and their categorization.
(iii) To measure the identified IT success factors for each category of public sector banks and compare different categories of PSBs on each of the IT success factors.
(iv) To develop IT success model for public sector banks.

Extensive review of literature has been carried out in the light of above objectives of the study. Based on the review of literature following 15 propositions divided into three categories to achieve second, third, and fourth objectives of the study have been
developed. The first objective of the study has been achieved by carrying out detailed analysis of the data on IT deployment of banks, given in chapter 1 of the thesis.

First set of propositions (based on comparison of IT efficiency of PSBs)

P1: Level of efficiency achieved through IT deployment varies between the PSBs
P2: Technical efficiency of PSBs improves with the deployment of IT over a period of time
P3: Scale inefficiency of PSBs decreases with the deployment of IT over a period of time.

Second set of propositions (based on comparison of performance of three categories of public sector banks on identified success factors)

P4: Level of system quality significantly differs in “most efficient”, “moderately efficient” and “less efficient” public sector banks.
P5: Level of information quality significantly differs in all the three identified categories of the banks.
P6: Level of service quality significantly differs in all the three identified categories of the banks.
P7: Level of user knowledge and involvement with IT systems significantly differs in all the three identified categories of the banks.
P8: Level of IT related strategic issues significantly differ in all the three identified categories of the banks.

Third set of propositions (based on relationships among the factors constituting IT success model)

P9: System quality significantly affects the user’s satisfaction with IT systems.
P10: Information quality significantly affects the user’s satisfaction with IT systems.
P11: IT service quality significantly affects the user’s satisfaction with IT systems.
P12: User knowledge and involvement significantly affects the user’s satisfaction with IT systems.
P13: IT related strategic issues significantly affect the user’s satisfaction with IT systems.
P14: User’s satisfaction with IT systems significantly affects individual’s performance.
P15: Impact of IT on individual significantly affects the bank’s performance.

Methodology adopted to achieve the objectives is as under:

First category of propositions mentioned above have been validated by applying DEA technique, details of which are given in chapter 4. Comparison of efficiency of IT deployment has also resulted in categorization of PSBs as “most efficient”, “moderately efficient” and “less efficient”. Second cluster of propositions have been validated by applying ANOVA one-way technique (using SPSS 16.0). Third cluster of propositions have been validated by using the parameter estimates and goodness-of-fit statistics of path analysis technique of structural equation modeling (using AMOS 18.0).

5.2 Findings of the study

The important findings which have emerged from the analysis, which is carried out in chapter 1 and 4, have been summarized below:

5.2.1 Extent of IT deployment in PSBs

The results on the first objective of the study i.e. the extent of IT deployment in public sector banks of India, reveals that deployment of IT has been slow and gradual in PSBs
as compared to their counter parts i.e. new private sector banks and foreign banks. From
day one new private sector banks and foreign banks started their operations with latest
technology with 100 percent computerization of branches. To cope up with competition
PSBs followed private sector banks and invested in technology but slowly and gradually.
Total expenditure incurred on computerization and development of communication
networks by PSBs between September 1999 and March 31, 2009 has been ₹17,897
crores (Table 1.1). The percentage of fully computerized branches to total branches has
increased from 3 percent in the year 1996 to 95 percent in the year 2009 (Table 1.4). The
proportion of fully computerized branches providing core banking solution (CBS)
increased rapidly to 79.4 percent at end March 2009 from 11 per cent at end-March 2005
(Table 1.4). Number of ATMs of PSBs has increased from 9,992 in year 2005 to 27,277
in the year 2009 (Table 1.5).

Banks get considerable cost advantage, when they are able to shift their customers to off-
branch banking channels i.e. ATMs, internet banking, phone banking and mobile
banking. New private sector banks and foreign banks are able to shift more than 70
percent of their customers to non banking channels, while in case of PSBs, the
percentage of customers using off-branch channels are less than 30 percent. This shows
transaction cost per customer is much higher in PSBs as compared to their counterparts.

5.2.2 Comparison of banks’ efficiency with respect to IT deployment (first set of
propositions)

Results of the study show that the average efficiency (technical efficiency obtained by
applying CCR model) of the banks’ with respect to IT has improved gradually from 0.85
in year 2003 to 0.91 in the year 2009 (Table 4.1). All the public sector banks are not
found to be efficient with respect to IT, since the average efficiency of each public sector bank for the period 2006 to 2009 varies from 0.64 to 1.0 (Table 4.1). Also, for the year 2008-09 in all, 12 out of 27 banks are found to be efficient with respect to IT deployment, while others are found to be inefficient (Table 4.1). Based on the average efficiency scores during the period 2006 to 2009, PSBs have been grouped in three categories. Banks obtaining the average efficiency score between 0.64 to 0.76 are placed in category of “less efficient”, those obtaining the average efficiency score greater than 0.76 but less than or equal to 0.88 are kept in the category of “moderately efficient” and those obtained the score of more than 0.88 are placed in the category of “most efficient” banks in IT deployment.

From the result of BCC model with output orientation, it is clear that average IT efficiency (management efficiency) of the banks remained more or less same during the period 2003 to 2009 i.e. 0.92 (Table 4.2). This suggests that improvement in average efficiency (technical) for the period 2003 to 2009 is due to improvement in scale efficiency rather than of management efficiency. This calls for proper utilization of IT resources such as finding proper locations of ATMs where they can be maximally utilized and ensuring the minimum downtime of the IT systems. It is also observed that overall average scale inefficiency of PSBs has been reduced from 7.77 percent in the year 2003 to 1.7 percent in the year 2009 (Table 4.3). This suggests that computerization particularly deployment of ATMs and core banking solution has helped the banks to become scale efficient. Table 5.1 provides the summary of support for the first set of propositions i.e. P1 to P3.
Table 5.1: Summary of the support obtained for the first set of propositions

<table>
<thead>
<tr>
<th>Propositions</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1: Level of efficiency achieved through IT deployment varies between the PSBs</td>
<td>Supported</td>
</tr>
<tr>
<td>P2: Technical efficiency of PSBs improves with the deployment of IT over a period of time</td>
<td>Supported</td>
</tr>
<tr>
<td>P3: Scale inefficiency of PSBs decreases with the deployment of IT over a period of time</td>
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5.2.3 Comparison of most efficient, moderately efficient and less efficient public sector banks on each of the IT success factors (second set of propositions)

To compare the performance of banks on each of the identified IT success factors, ANOVA one-way technique has been applied. As expected most efficient category of banks have performed better than the moderately efficient banks and less efficient banks on all the IT success factors except on the dimensions of system quality and strategic issues, on which no significant mean difference have been found between most efficient banks and moderately efficient banks. Also mean difference has not been found significant for ‘assurance’ dimension of service quality among three categories of banks. Moderately efficient banks as compared to less efficient banks have obtained high mean score on all the IT success factors, though on three dimensions of service quality i.e. responsiveness, assurance and empathy mean difference have not been found significant. Table 5.2 provides the summary of support for the second set of propositions i.e. P4 to P8.
Table 5.2: Summary of the support obtained for the second set of propositions

<table>
<thead>
<tr>
<th>Propositions</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>P4: Level of system quality significantly differs in “most efficient”, “moderately efficient” and “less efficient”, public sector banks.</td>
<td>Not supported*</td>
</tr>
<tr>
<td>P5: Level of information quality significantly differs in all the three identified categories of the banks.</td>
<td>Supported</td>
</tr>
<tr>
<td>P6: Level of service quality significantly differs in all the three identified categories of the banks.</td>
<td>Supported</td>
</tr>
<tr>
<td>P7: Level of user knowledge and involvement with IT systems significantly differs in all the three identified categories of the banks.</td>
<td>Supported</td>
</tr>
<tr>
<td>P8: Level of IT related strategic issues significantly differ in all the three identified categories of the banks.</td>
<td>Not supported*</td>
</tr>
</tbody>
</table>

* No significant mean difference has been found between most efficient banks and moderately efficient banks categories, while difference has been found significant between most efficient and less efficient categories as well as moderately efficient and less efficient categories.

5.2.4 A model of IT success for public sector banks (third set of propositions)

In order to develop the model of IT success and to identify relationship among factors that constitute the model, parameter estimation statistics and goodness-of-fit statistics of path analysis technique of structural equation modeling have been applied separately for each category of PSBs. Parameter estimation statistics in all the three groups of public sector banks have revealed that system quality, service quality, user knowledge and involvement and strategic issues significantly affect the user satisfaction, while information quality does not affect the user satisfaction significantly. This may be due to the fact that information obtained from IT systems has now stabilized i.e. IT systems are providing relevant, accurate, precise and complete information and it do not bother the users any more. Further in all the three groups, user satisfaction does significantly affect individual performance and further individual performance significantly affects the bank
performance. Goodness of fit statistics of the model i.e. CMIN/DF, CFI, GFI, RMR and RMSEA has been found favorable for the model in all the categories of banks. Similar results in all the three groups affirm the relationship among the factors of IT success model and verification of a model proposed by the researchers, except of the fact that information quality significantly affects user’s satisfaction. Public sector banks can enhance the business performance using the model proposed by the researchers.

In most efficient banks category, the study indicated that among the factors that affect the user satisfaction, ‘system quality’ (with the largest std_β value of 0.366) is the best predictor, followed by service quality (std_β value of 0.275), user knowledge and involvement (std_β value of 0.211) and strategic issues (std_β value of 0.180). Most efficient banks in order to improve user satisfaction and hence bank’s performance need to manage the success factors as per their relative importance i.e. system quality, service quality, user knowledge and involvement and finally strategic issues. The superior performance on the most important dimension, ‘system quality’ may be helpful in enhanced degree of user satisfaction with IT. Service quality (with the std_β value of 0.275) is found to be second important factor affecting the user satisfaction. Further to find the priority areas of service improvement, regression analysis has been conducted using overall service quality as dependent variable and tangibility, reliability, responsiveness, assurance and empathy as independent variables and results revealed that not all the dimensions influence the users’ perception of IT service quality. The study indicated that from the dimensions of service quality, ‘responsiveness’ (with largest std_β value of 0.357) is the best predictor, followed by ‘empathy’ (with the std_β value of 0.316), while ‘tangibility’, ‘reliability’ and ‘assurance’ turned out to be insignificant in
determining overall service quality. Thus superior performance on the most important
dimension, ‘responsiveness’ may be helpful in providing enhanced quality of service.

In moderately efficient banks category, the study revealed that among the dimensions that
influence the user satisfaction, ‘system quality’ (with std_β value of 0.331) is the best
predictor, closely followed by service quality (with std_β value of 0.316), then almost
equally by strategic issues (with std_β value of 0.202) and user knowledge and involvement
(with std_β value of 0.201). Outcome indicates that moderately efficient banks need to
commit their resources to manage the IT success factors as per their relative importance i.e.
system quality, service quality, followed by almost equal importance to strategic issues and
user knowledge and involvement in order to improve bank performance. Further to find the
priority areas of service improvement, regression analysis has been conducted using overall
service quality as dependent variable and tangibility, reliability, responsiveness, assurance
and empathy as independent variables and results revealed that not all the dimensions
influence the users’ perception of IT service quality. The study indicated that from the
dimensions of service quality, ‘responsiveness’ (with std_β value of 0.350) is the best
predictor, followed by ‘empathy’ (with std_β value of 0.331) and ‘tangibility’ (with std_β
value of 0.225). ‘Reliability’ and ‘assurance’ turned out to be insignificant in determining
overall service quality. Thus enhanced quality of service can be achieved by improving the
performance on the dimensions i.e. ‘responsiveness’, ‘empathy’ and ‘tangibility’.

In less efficient banks category, the study indicated that ‘system quality’ (with std_β
value of 0.266) dimension influences the user satisfaction the most. This is followed by,
user knowledge and involvement (with std_β value of 0.258), ‘service quality’ (with std_β
value of 0.222) and strategic issues (with std_β value of 0.203). Less efficient
banks are required to deploy the resources to manage the IT success factors as per their relative importance i.e. system quality, user knowledge and involvement, service quality and strategic issues in order to enhance user’s satisfaction, in turn individual’s performance and hence bank’s performance. Further to find the priority areas of service improvement, regression analysis have been conducted and results revealed that not all the dimensions influence the users’ perception of IT service quality. The study indicated that from the dimensions of service quality, reliability is the best predictor (with largest std_β value of 0.278), followed by ‘responsiveness’ (with std_β value of 0.246) and ‘empathy’ (with std_β value of 0.216). ‘Tangibility’, and ‘assurance’ turned out to be insignificant in determining overall service quality. Thus enhanced quality of service can be achieved by improving the performance on the dimensions i.e. ‘reliability’, ‘responsiveness’ and ‘empathy’. Table 5.3 provides the summary of support for the third set of propositions i.e. P9 to P15.

Table 5.3: Summary of the support obtained for the third set of propositions

<table>
<thead>
<tr>
<th>Propositions</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>P9: System quality significantly affects the user’s satisfaction with IT systems.</td>
<td>Supported</td>
</tr>
<tr>
<td>P10: Information quality significantly affects the user satisfaction with IT systems.</td>
<td>Not supported</td>
</tr>
<tr>
<td>P11: IT service quality significantly affects the user satisfaction with IT systems.</td>
<td>Supported</td>
</tr>
<tr>
<td>P12: User knowledge and involvement in IT systems would significantly affects the user satisfaction with IT systems in the public sector banks.</td>
<td>Supported</td>
</tr>
<tr>
<td>P13: IT related strategic issues significantly affects the user satisfaction with IT systems.</td>
<td>Supported</td>
</tr>
<tr>
<td>P14: User Satisfaction with IT systems significantly affects individual’s performance.</td>
<td>Supported</td>
</tr>
<tr>
<td>P15: Impact of IT on individual significantly affects the bank’s performance.</td>
<td>Supported</td>
</tr>
</tbody>
</table>
Based on the findings of the study the final model of IT success emerged is shown in Figure 5.1.

**Figure 5.1: Developed model for public sector banks**

5.3 Recommendations

Based on the findings of the study, the followings are the important recommendations and policy implications for public sector banks.

(i) It is noticed that there is a time lag between IT investment and increase in efficiency/productivity. There is a possibility of reducing the time lag by expediting the process of connectivity of operations between branches as well as banks through core banking. This shall result in realizing the full potential of IT resources within short period of IT investment. The remaining bank branches needs to be fully computerized with core banking solution at the earliest.

(ii) Transactions made through ATMs and internet modes as a percentage of aggregate transactions are still less. Banks should make efforts to increase electronic
transactions especially internet transactions to bring down the cost and increase the productivity.

(iii) The study shows that there has been gradual improvement in overall efficiency of public sector banks with respect to deployment of IT. This improvement is due to improvement in scale efficiency rather than management efficiency or pure technical efficiency. It implies that banks still have scope to improve management efficiency by focusing on better utilization of IT resources. This can be achieved through reduction of down time of the systems, enhancing IT usage capabilities of the work force and customer education to enhance the use of IT systems for availing the services.

(iv) There are differences between banks in terms of efficiency attained with the deployment of IT. It indicates that the banks with lower relative efficiency with respect to IT can emulate other banks which have achieved relatively high level of efficiency. To attain this they should study the IT policies and practices of the efficient banks and identify the critical success factors.

(v) IT success factors such as system quality, service quality, user knowledge and involvement and strategic issues influence user satisfaction and thus ensure individual performance and bank performance. The banks are therefore advised to focus their attention on improving the success factors to improve their overall performance. The suggestion for the concerned banks with regard to improvement of system quality is to enhance systems ability to quickly recover from errors and ensure continuous functioning of the IT systems. Improvements in respect of user knowledge and involvement can be achieved by imparting appropriate training so
that the users develop complete understanding of IT systems and use them effectively. In order to improve performance on strategic issues, there is a need for a proactive approach by the management in strategically aligning the IT objectives with the bank processes and objectives.

(vi) Most efficient banks in order to improve user satisfaction and hence IT effectiveness need to manage the success factors as per their relative importance i.e. system quality, service quality, user knowledge and involvement and finally strategic issues. In order to improve quality of IT services, attention is to be focused on the most important dimension i.e. ‘responsiveness’ by providing prompt service to the users of IT systems and help them willingly. The next dimension to be focused is ‘empathy’, which requires understanding the specific needs of the users and pay individual attention to their needs.

(vii) Moderately efficient banks need to commit their resources to manage the IT success factors as per their relative importance i.e. system quality, service quality, followed by almost equal importance to strategic issues and user knowledge and involvement in order to improve IT effectiveness. Further, in order to improve quality of IT services, superior performance on the most important dimension, ‘responsiveness’ followed by ‘empathy’ and ‘tangibility’ may be helpful. The dimension of ‘tangibility’ can be improved by increasing the number of personnel providing IT services and updating the hardware and software products to meet the systems requirement.

(viii) Moderately efficient banks need definite improvement on service quality and user knowledge and involvement factors as on these factors their performance is less than most efficient banks.
(ix) Less efficient banks are required to deploy the resources to manage the IT success factors as per their relative importance i.e. system quality, user knowledge and involvement, service quality and strategic issues in order to improve IT effectiveness. In order to improve quality of IT services, banks need to focus on most important dimension, ‘reliability’, followed by ‘responsiveness’ and ‘empathy’. Improvements on the dimension of ‘reliability’ can be achieved through proper and timely response to the IT users’ complaint and keep them informed of the action being taken on the complaints.

(x) Less efficient banks need definite improvement on all the IT success factors i.e. system quality, user knowledge and involvement, service quality and strategic issues as their performance is less than the most efficient banks and moderately efficient banks on all the factors.

5.4 Research contribution

This study is interdisciplinary in nature with multiple perspectives from the fields of information technology, finance, marketing, human resources and decision sciences. The following is the research contribution of the study:

(i) Study identifies and categorizes banks into most efficient, moderately efficient and less efficient based on the efficiency attained from deployment of IT.

(ii) Study also explains the reasons for the difference in the levels of efficiency by comparing the performance of banks on identified success factors.

(iii) This study, based on the identified factors and their relationships, presents IT success model for public sector banks.
Study identifies the issues and challenges of information technology in banks and offer suggestions for improving the efficacy of IT deployment.

The study would help the IT managers of the banks to understand the perception of IT users regarding the IT services, IT systems, their information needs and IT training requirements of the users.

This study provides a framework to the IT practitioners for effective deployment and use of IT systems in the banks.

5.5 Limitations of the study

The study only covered the public sector banks of India and all other scheduled commercial banks i.e. private sector, foreign sector and regional rural banks are not included in the study.

The survey is conducted in the NCR and therefore included the perception of employees of the banks working in NCR.

The survey focused on the users of IT at officer level of banks and has not included employees working at clerical level, customers, IT staff and outsourced vendors.

Data like IT training expenditure, percentage of IT transactions to total transactions etc. could not be collected from all the banks. Respondents have expressed their inability to provide the data either due to non availability or due to confidentiality reasons. Hence these variables could not be considered for application of DEA technique.

The model of IT success has been suggested for public sector banks. However the proposed success model could be validated on limited scale due to time and resource constraints.
IT service providers in the bank include IT division of the bank as well as outsourced service providers that provide services to the users of IT in the bank. The study has captured single rating from each IT user for all types of IT service providers. Separate ratings for IT division and outsourced service providers are not considered.

5.6 Suggestions for future work

The following research directions for further research have been identified.

(i) A comparative study of impact of information technology on performance may be undertaken among public sector, private sector and foreign sector banks.

(ii) A cross national comparative study of impact of information technology on performance of banks can be conducted using the framework of the present study.

(iii) Impact of information technology on performance of cooperative sector and regional rural banks may also be undertaken.

(iv) Impact of information technology on the performance of banks can be studied from customers’ perspective.

(v) There may be a possibility of cultural differences playing a role in the outcome of the study. Thus, the results of the study can be explored further by taking the perception of the employees working in rural branches.

(vi) IT service providers in the bank are IT division of the bank as well as outsourced service providers that provide services to the users of IT in the bank. The study has captured single rating from each IT user for all type of IT service providers. Separate ratings for IT division and outsourced service providers may be considered.
5.7 Concluding remarks

The present study which has focused on PSBs of India has led to the conclusion that the banks differ in terms of the efficiency attained from the investment made in IT during the period of study. It is noticed that there has been consistent improvement in the average IT efficiency of banks during the study period. As regards the success factors contributing to the efficiency of banks, it has emerged from the study that system quality, service quality, user knowledge and involvement and strategic issues influences the user satisfaction, which in turn affects the individual performance and ultimately bank performance. The banks represented by moderately efficient banks are required to improve on the factors namely system quality, service quality, strategic issues and user knowledge and involvement with preference in same order as mentioned to enhance their efficiency from IT. In order to improve the efficiency from IT, the banks represented by the category of less efficient banks should focus on system quality, user knowledge and involvement, service quality and strategic issues as per their relative importance. Finally, it may be concluded that the banks irrespective of category have scope to improve on the all the significant success factors.