Role of Information Systems in Banks: An Empirical Study in the Indian Context

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Introduction

Over the last three decades, there has been a phenomenal increase in the size, spread, and activities undertaken by banks in India. From approximately 8,000 bank branches in 1969, the number has now reached over 64,000. With the entry of new banks, there is intense competition for attracting and retaining the customers. Under these circumstances, the use of computers and allied technologies has become inevitable to achieve a satisfactory level of customer service. Computers are best suited to a situation in which large volumes of transactions have to be processed within a short period of time. Banking as a service industry exactly fits into this description.

The first blueprint for computerization and mechanization in the banking industry in India was drawn up in 1983-84, under the aegis of the Rangarajan Committee. The Committee analysed the then prevailing banking scenario and identified the areas and functions where mechanization would be essential. As per the agreement with the workers' union, initially, only memory machines were installed at the bank branches, which were named as Advanced Ledger Posting Machines (ALPM). Since then, there has been a continuous development in information technology in banks and, at the end of September 1998, there were 3,668 fully computerized branches and 6,961 partially computerized branches in the public sector (RBI, 1999). In his notification dated November 27, 1998, N Vittal, Central Vigilance Commissioner, had asked the banks to ensure that 70 per cent of their business was captured through computerization before January 1, 2001. It is now widely believed that banks are increasingly dependent on the Information Systems (IS) for their day-to-day operations and IS has helped banks reduce cost and differentiate their products from the competitors' products. This study is carried out to give an empirical support to this belief.
Traditionally, IS has been viewed by its practitioners as playing only a supportive role. Recently, however, due to a significant decline in the cost of information technology (IT) and greatly improved speed and power of computers, IS has moved from its traditional role as an application of back office support to one offering opportunities for gaining significant competitive advantage. It is being increasingly viewed as having the capability to alter core organizational directions, reorient corporate strategy, and redefine industry structure.

In recent years, there has been increased awareness among organizations of the potential of IT and use of IS to exploit its potential and use it effectively. Past studies indicate that some industries have greater potential for exploiting IT than others. The level of dependence on IS and, the potential for using IS for strategic purposes varies among organizations (McFarlan; McKenny and Pyburn, 1983). Cash, et al (1988) argue that IT will play a more strategic role in service-oriented industries such as banks, insurance, and publishing than process-oriented industries such as cement and oil. McFarlan; McKenny and Pyburn (1983) first identified different roles and represented them on the 'Strategic Grid.' Strategic Grid is a 2 x 2 matrix formed by representing the strategic impact of present information system on one axis and the impact of future information system on the other axis. According to them, the four roles of information system are: Strategic, Turnaround, Factory, and Support.

The importance of knowledge of IS role has been emphasized by many researchers (McFarlan; McKenny and Pyburn, 1983; Sullivan, 1985; Premkumar and King, 1992). Strategic Grid also facilitates strategy formulation of IS. McFarlan; McKenny and Pyburn (1983) emphasized that the characteristics of IS planning system must match the role that IS plays in the organization. An organization may not be able to achieve strategic impact with IS using a planning system primarily focused on operational issues. On the other hand, a firm that does not plan to use IS for strategic purposes may be wasting its resources by using sophisticated IS planning methodology (Sullivan, 1985). Strategic Grid is a useful framework for understanding the positioning of an organization’s IT and as a basis for designing appropriate planning and control systems for IT management (Ives and Learmonth, 1984; Lucas, 1994; Raghunathan; Raghunathan and Tu, 1999). Premkumar and King (1992) have empirically evaluated the differences in planning, organizational support, and performance characteristics of IS planning among organizations with different roles of IS.

Strategic Grid is a dynamic framework and organizations may be shifting from one group to another. Because of strategic information systems, an organization positioned in one strategic group today may shift to another group over a period of time. This is because competitors may develop a similar strategic system causing loss of competitive advantage thereby leading to reduced level of impact of IS on business performance. Therefore, knowledge of the role of IS and its continuous monitoring is essential.

In view of the diverse scope of IS roles, it is important to understand the appropriateness of the roles and the contribution accrued by the use of multifaceted applications of IS. Lack of such an understanding can lead to inappropriate use of the technology, inadequate resource allocation, and ineffective use of IS for competitive advantage. Therefore, an attempt has been made in this paper to investigate the role of IS in public sector, private sector, and foreign sector banks by locating their position on the Strategic Grid.

**Research Model**

The concept of Strategic Grid is used here to determine the role played by IS in banks. This helps to categorize organizations in one of the following four categories.

**Strategic**

Some companies are critically dependent on the smooth functioning of IS activity for their daily operations and have applications under development that are vital to their competitive success. These companies also need to do a considerable amount of planning. Banks and insurance companies generally fall in this category.

**Turnaround**

Although some companies may receive considerable operational support from IS, they are not totally dependent on uninterrupted functioning of this support to achieve either long-term or short-term objectives. The applications under development, however, are absolutely vital for achieving the company's strategic objectives. Rapidly growing manufacturing companies are a very good example of this category.
Companies under this category depend heavily on IS support for smooth operations. Their application development portfolios, however, contain maintenance work and applications that are not vital for competitive advantage. Some manufacturers, airlines, and retailers fall in this category.

Support

The role of IS is categorized as supportive in some companies which do not depend entirely on the smooth functioning of IS activity nor are their application portfolios critical for the company's strategic success. Extraction industries fall under this category.

The role of IS was assessed using two dimensions of the Strategic Grid described by Cash, et al. (1988). Multi-item construct was used to measure the present and future impact of IS in banks. After reviewing the items suggested by Cash, et al. (1988) and adopted by Premkumar (1992), and also checking for their theoretical relevance with respect to defining the role of IS in the banking sector, a list of ten items was selected. Two senior faculty members from banking institutes in India and four faculty members (IT management) from educational institutes were involved for content validity of the questionnaire. The questionnaire was duly corrected based on feedback obtained and, finally, nine items were selected to measure the two dimensions. Subsequently, two items had to be dropped due to problems in convergent validity. Hence, seven items were used for measuring the two dimensions - present and future impact of IS in banks. The impact of one hour shutdown of the computer, feasibility of manual processing of data related to deposit and withdrawal of cash, and bank's critical dependency on the present IS were used to determine the impact of IS. For determining the future impact of IS, items such as whether banks were developing new systems for efficiency improvement, whether systems were developed to create new service delivery channels/products (e.g., ATM, net banking, etc.), whether IS were providing new ways to compete by offering technology-based efficient payment systems or reaching more customers at lower cost, whether IS applications under development were vital for bank's strategic objectives, etc. were used. All items were measured using a five-point Likert-type scale.

Data Collection and Analysis

For data collection, ten sets of questionnaire were mailed by courier or electronically to the IT heads of all commercial banks operating in India with a request to get the responses from key IT personnel. The target population consisted of 104 commercial banks, which included 27 public sector banks, 34 private sector banks, and 43 foreign sector banks. After one month, they were reminded through e-mail, fax, and phone. In some cases, personal visits to the respondents were also arranged, ultimately resulting in responses from 52 banks yielding 50 per cent representation of the target population. The number of responses obtained and the number of banks which participated in the study from each sector is given in Table 1.

Validity and Reliability of the Research Construct

Multi-item indicators used for measuring the two dimensions of the grid were tested for construct validity and reliability. Construct validity measured the extent to which the indicator measured the underlying construct, whereas reliability measured the consistency of the instrument. Construct validity was evaluated using factor analysis to confirm whether all the items measured the construct cluster together and measured a single construct. The method of principal component with varimax rotation was used for factor analysis. Reliability was assessed using Cronbach's alpha. The obtained results of validity and reliability testing are given in Table 2 which indicated that the used instrument was valid and reliable.

Data Analysis and Results

The present and future impact of IS for each bank was determined by locating it on the Strategic Grid depending on whether the mean score of the present and future impact of IS for the bank was above or below the sample mean value. Figure 1 indicates the location of bank groups and Table 3 indicates the number of banks lying in different cells of the Strategic Grid. A comparison of the role of IS among three sectors (taken as three groups) of the banks

Table 1: Statistics of Obtained Responses

<table>
<thead>
<tr>
<th>Category</th>
<th>Responses Obtained</th>
<th>No. of Banks Participated</th>
<th>Percentage of Total Banks Participated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Banks</td>
<td>73</td>
<td>19</td>
<td>36.54</td>
</tr>
<tr>
<td>Private Banks</td>
<td>51</td>
<td>19</td>
<td>36.54</td>
</tr>
<tr>
<td>Foreign Banks</td>
<td>33</td>
<td>14</td>
<td>26.92</td>
</tr>
<tr>
<td>Total</td>
<td>157</td>
<td>52</td>
<td>100</td>
</tr>
</tbody>
</table>
Table 2: Results of Validity and Reliability Testing

<table>
<thead>
<tr>
<th>Construct</th>
<th>Number of Items</th>
<th>Minimum Variance Factor Loading</th>
<th>Alpha Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present Impact of IS</td>
<td>3</td>
<td>0.679</td>
<td>35.496</td>
</tr>
<tr>
<td>Future Impact of IS</td>
<td>4</td>
<td>0.661</td>
<td>29.111</td>
</tr>
</tbody>
</table>

was done using Chi-square test of significance for independence. The results are shown in Table 3 which indicate that the role of IS varies significantly among banking groups (p< 0.005). A significant percentage of the public sector banks are in the ‘Support’ category, whereas a significant percentage of the private and foreign banks are in the ‘Strategic’ category.

To ascertain whether there was a significant difference between the present impact of IS in the three groups of banks, another Chi-square test was performed. The results of the test are given in Table 4. Similarly, one more Chi-square test was done to determine whether the future impact of IS varied significantly among banking groups. The results of this test are presented in Table 5.

Results of Tables 4 and 5 indicate that the present impact of IS varied significantly (p<0.005) with the banking groups whereas the future impact of IS did not.

Discussion

The role of IS which reflects the present and future impact of IS on the organization has been found significantly different among three groups of banks (public, private, and foreign). There are more public sector banks (52.63%) in the ‘Support’ category, whereas a higher percentage of private (52.63%) and foreign banks (71.43%) are in the ‘Strategic’ category. There could be two important reasons for such differences. First, most of the foreign and private banks have been established after developing a proper base in IT and are, therefore, in a position to harness the benefits of IT to its full extent. Second, foreign and private sector banks focus more on the niche market segment covering mostly metros and urban cities whereas public sector banks cater to rural areas as well. Therefore, the expectations of the customers of foreign and private banks could be different from that of the public sector banks forcing them to use IS for strategic purposes.

It is clear from Figure 1 that public sector banks are in the ‘Support’ cell of the Strategic Grid because both the present and the future impact of IS in this group of banks is lower than the sample mean value.

Table 3: Role of IS-Chi-square Test

<table>
<thead>
<tr>
<th>Sector</th>
<th>Support</th>
<th>Factory</th>
<th>Turnaround</th>
<th>Strategic</th>
<th>Total Number of Banks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Banks</td>
<td>10</td>
<td>4</td>
<td>5</td>
<td>-</td>
<td>19 (52.63) (21.05) (26.32)</td>
</tr>
<tr>
<td>Private Banks</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>10</td>
<td>19 (31.58) (19.53) (5.26) (52.63)</td>
</tr>
<tr>
<td>Foreign Banks</td>
<td>3</td>
<td>1</td>
<td></td>
<td>10</td>
<td>14 (21.43) (7.14) (71.43)</td>
</tr>
<tr>
<td>Column Total</td>
<td>19</td>
<td>7</td>
<td>6</td>
<td>20</td>
<td>52</td>
</tr>
</tbody>
</table>

Figures shown outside the parentheses indicate the number of banks and inside the parentheses percentage of banks. Chi-square = 21.81. Degree of Freedom = 6. Significance = 0.001.

Table 4: Present Impact of IS- Chi-square Test

<table>
<thead>
<tr>
<th>Sector</th>
<th>Low Impact</th>
<th>High Impact</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Banks</td>
<td>15 (78.95)</td>
<td>4 (21.05)</td>
<td>19</td>
</tr>
<tr>
<td>Private Banks</td>
<td>7 (36.84)</td>
<td>12 (63.16)</td>
<td>19</td>
</tr>
<tr>
<td>Foreign Banks</td>
<td>3 (21.43)</td>
<td>11 (78.57)</td>
<td>14</td>
</tr>
<tr>
<td>Column Total</td>
<td>25</td>
<td>27</td>
<td>52</td>
</tr>
</tbody>
</table>

Figures shown outside the parentheses indicate the number of banks and inside the parentheses percentage of banks. Chi-square = 12.2. Degree of Freedom = 2. Significance = 0.002.
Table 5: Future Impact of IS-Chi-square Test

<table>
<thead>
<tr>
<th>Sector</th>
<th>Low Impact</th>
<th>High Impact</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Banks</td>
<td>14 (73.68)</td>
<td>5 (26.32)</td>
<td>19</td>
</tr>
<tr>
<td>Private Banks</td>
<td>8 (42.1)</td>
<td>11 (57.9)</td>
<td>19</td>
</tr>
<tr>
<td>Foreign Banks</td>
<td>4 (28.57)</td>
<td>10 (71.43)</td>
<td>14</td>
</tr>
<tr>
<td>Column Total</td>
<td>26</td>
<td>26</td>
<td>52</td>
</tr>
</tbody>
</table>

Figures shown outside the parentheses indicate the number of banks and inside the parentheses percentage of banks. Chi-square = 7.3. Degree of Freedom = 2. Significance = 0.026.

Although both private as well as foreign banks occupy the 'Strategic' cell of the grid, the foreign banks have scored more as compared to private banks. This indicates that the focus, dependency, and strategic importance of IT is more in foreign banks than in private banks.

It has been empirically proved that while the present impact of IS varies significantly (p<0.005) with the banking groups, the future impact of IS does not. This indicates that all banks whether private, public or foreign, have applications under development that will give them strategic advantage in future. The increased use of ATM networks, the spread of Shared Payment Network Systems (SPNS), the use of Indian Financial Network (INFINET), and the recent initiatives of internet banking and mobile banking support the study's findings.

Conclusion

There is a significant need for determining the role of IS in banks. This would assure the top management that the IS development is in the right direction. This would also help in exploring the intended and the real role of IS in banks. The knowledge of the real role of IS in banks would help IS managers in managing information systems by judging the business needs of the IS projects, associated risks, importance and ranking of IS managers in organizational hierarchy, need for innovation and flexibility in IS planning approach, etc. The IS practitioners may use the variables used here for self-evaluation and for deciding about the IS development.

It has been well recognized that IS plays different roles in different industries. However, there is limited research examining the differences in the role of IS within a single industry. This study empirically explores the differences in the role of IS among public, private, and foreign banks. Results indicate that while, at present, only private and foreign banks have obtained strategic advantages using IT, public sector banks, although late, have also realized the importance of IT. It has been empirically proved that the future impact of IS does not vary significantly with the banking groups. This suggests that IS efforts put in by the public sector banks are in the right direction and can be expected to give them a strategic advantage in future.

Foreign and private banks, though in the strategic group today, have to constantly harness IS for strategic advantage to maintain their position. Sustaining competitive advantage is very difficult, because IS managers have to continuously evaluate the bank's applications portfolio with respect to technology and their competitors. Public sector banks have to search for ways to shift from support group to the strategic group in order to enjoy a strategic advantage from the use of IS. In order to achieve this objective, they may have to formulate a different IS strategy so as to make them competitive enough to survive. Future research could evolve suitable IS strategies for all the three sectors.

This paper has tried to locate the banks on the Strategic Grid. However, the level of computerization of various branches of a bank may be different and hence their dependency on IT may be different. Future research may involve locating the various branches and departments of a bank on the Strategic Grid and suggesting a suitable strategy for the branch. This study has the limitation that data are collected only from key IT executives. Perceptions of the bank's business executives may be different from that of the IT executives. Therefore, future research could also attempt obtaining and analysing the opinion of bank's business executives and looking for perceptual differences, if any. Another interesting area of future research could be to unearth the reasons for adopting a particular role of IS and to explore facilitators and inhibitors in using IS for strategic use.

Bibliography


