A Multidimensional Model of Information Resource Management

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The management of the information systems function, especially as represented by the information resource management (IRM) concept, is of growing importance to today’s organizations. Developments in IS technology, end user applications, and the strategic use of information systems are driving a search for better ways to use and manage the information system resources of an organization. This paper explores some of the developments shaping the IRM concept, various views of IRM, and some of the research which reveals industry perceptions of IRM.

Information systems present managers with major managerial challenges. Thus, information resource management (IRM) which involves managing the information system resources of a business firm, has become a major responsibility of modern managers.

Effective use of the IRM concept is hampered by a lack of clarity about what the IRM concept means. Many early users of the term IRM meant it to relate almost exclusively to data management - the idea of treating data and information as a resource to be managed. While some writers continue to hold a view of IRM that is rather narrowly focused on the management of data as a resource, other writers address a much broader set of issues under the term IRM. The broad interpretation of IRM stresses the concept that data and information themselves, as well as, information systems, hardware, software, and personnel are valuable resources that must be managed by all levels of management for the strategic and operational benefit of the entire organization. Thus, in this broader view, IRM encompasses the management of all information and information systems resources and encompasses the management of these resources by both end user managers and IS personnel.

Since IRM is a concept that is intended to be used as a guide to more effective management of information systems, it is important to examine the perceptions that industry leaders have of the IRM concept and to determine the extent to which measures associated with the IRM concept have been implemented. This paper presents both a conceptual framework for IRM in its broadest interpretation and the results of an empirical study based on that framework. First we will review
some of the important developments shaping the IRM concept and examine various alternative views of IRM that have appeared in the literature. Based upon this review, we propose a conceptual framework for IRM which is designed to integrate major elements of several alternative views of IRM into a single, multidimensional framework. The empirical component of this paper examines the degree of acceptance and implementation of IRM concepts associated with this conceptual framework. It reports the results of a survey of industry information systems executives and practitioners. This survey asks IS practitioners to indicate what they consider to be the most important elements of the IRM concept and asks them to indicate the degree to which their firms have implemented various activities and policies associated with the IRM concept.

**Alternative Views of IRM**

It is important to understand that information resource management means different things to different people. Surveys of information systems literature as well as research studies bear this out (Guimaraes, 1985, 1988; O'Brien and Morgan, 1980; Trauth, 1989). In his paper reviewing the IRM literature Guimaraes describes three alternative views of IRM each of which has a significantly different focus (Guimaraes, 1988). He shows that various authors view IRM as either (1) the management of information as a resource, (2) the management of information systems development and improvement, and (3) the management of information systems technology in an organization. Another review article by Trauth (1989) identifies three “disciplines” from which IRM has evolved. These are, 1. database management, 2. records management, and 3. data processing management. The records management “discipline” cited by Trauth originates in library science and governmental agencies and focuses on efforts to minimize the proliferation of paperwork and redundant document processing. For our purposes records management will be viewed as an element of database management or the management of information as a resource.

Based upon these two review studies we can identify three major approaches to IRM which have been the focus of most of the IRM literature. Furthermore, there is nothing inherently contradictory in the three alternative approaches. Thus, an inclusive view could be proposed in which all three of these approaches are seen as elements of IRM. Corresponding to the alternative “approaches” and “disciplines” proposed by Guimaraes and Trauth, our multidimensional model includes resource management, functional management, and technology management as fundamental components or IRM. Our resource management component, corresponds to the concept of information as a resource but has been broadened to include management of all other IS resources as well. The elements of our proposed multidimensional framework will be explained in more detail in the next section.

While the three elements described above encompass the major strands of the IRM literature historically, the recent literature supports the expansion of the IRM model to include two additional elements. The concepts of strategic management and distributed management are suggested as key areas on which IRM should focus in the future.

The success of several highly publicized strategic information systems applications has spurred top management’s desire to find new and creative ways to use information resources in pursuing the strategic objectives of the firm (Cash, 1988; Doll, 1989). At the same time new IS technologies and methodologies supporting the development of strategic systems have emerged (Ives and Learmonth, 1984), and recent IRM related articles (Corbin, 1988; Perez, 1988; Sato and Masahiro, 1988) have suggested that strategic management needs to be an important element of IRM.

In a recent article A. W. Zijlker argues that the focus of IRM should be to “make information technology add maximum value by putting it in the hands of the people who were there to add value in the first place(1988).” He argues for a view of
IRM that focuses on decentralization, end user support, and the effective management of IS resources in an environment in which both the resources themselves and the responsibility for managing them are decentralized. Other recent articles have focused on end user concerns and responsibilities with respect to IRM (Rathswohl, 1990) and IRM as a coordinating mechanism within organizations between IS departments and end users (Sato and Masahiro, 1988). Thus distributed management is an emerging element of IRM as seen by some researchers.

A Multidimensional Model of IRM

In the authors’ view, the alternative perspectives reviewed above do not represent conflicting views, but rather are differences in focus or emphasis. Thus we propose that all five of the perspectives be integrated into a multidimensional concept of IRM. In this conceptual framework, IRM consists of the management of the information system resources of an organization for the strategic and operational benefit of an organization. Five major components or dimensions must be successfully managed in order to achieve the objectives of IRM. These are: (1) resource management, (2) technology management, (3) functional management, (4) strategic management, and (5) distributed management. Figure 1 illustrates this multidimensional framework (O'Brien, 1988). In the subsections that follow the individual components of this multidimensional model are described in greater detail.

Resource Management

IRM views data and information, as well as computer hardware, software and personnel as valuable resources that should be effectively and efficiently managed for the benefit of the entire organization. If plant and equipment, money, and people are considered valuable organizational resources, so should its data, information, and other information system resources. This is especially true if the organization is committed to building a strategic information resource base to be used for strategic planning, and if it wants to develop innovative products and services that incorporate information systems technology (Guimaraes, 1988; O'Brien, 1988). Figure 2 illustrates how IRM can be viewed as consisting of three major resource management functions: enterprise resource management, system resource management, and data resource management (Bryce and Bryce, 1988).

Technology Management

IRM emphasizes that all technologies that process and deliver data and information must be managed as an integrated system of organizational resources. This includes telecommunications and office automation systems, as well as traditional
computer-based information processing. These "islands of technology" are bridged by the IRM concept. Thus IRM becomes the primary focus of the executive in charge of all information services, sometimes called the chief information officer (CIO) of the organization (Benjamin, Dickinson and Rockart, 1985). Given this mission, the information systems function becomes "a business within a business" whose chief executive is charged with coordinating all information system technologies for the strategic benefit of the organization. Figure 3 illustrates this view of IRM as the integration of IS technologies (McFARlan and McKenney, 1982).

**Functional Management**

The IRM concept stresses that the management of an organization must apply common managerial functions and techniques to the management of information resources. They must use managerial techniques (like planning models, management by objectives, financial budgets, functional organization, etc.) just as they do with other major resources and activities of the business. The information systems business is no longer treated as a ‘special case’ department that is too technically complex and dynamic to be managed effectively. Instead, it is treated like other functions and expected to use managerial techniques employed by other business units, to manage the major activities that are unique to the information systems function. Figure 4 illustrates a view of IRM as a unique collection of managerial sub-functions which depend on both generic and function-specific managerial techniques (Guimaraes, 1988).

**Strategic Management**

The IRM concept stresses that the information services function in the firm must be more than a provider of computer services. It must also make major contributions to the profitability and strategic objectives of the firm. Thus, the informa-"
tion systems function must change from an information services utility to a producer of information products that earn profits for the firm and give it a comparative advantage over its competitors. Companies can develop strategic information systems to gain a competitive edge. Using this perspective, the IRM function focuses on developing and managing information systems that significantly improve operational efficiency, promote innovative products and services, and build a strategic information resource base that can improve the competitiveness of the organization (Cash, 1988; Porter and Milar, 1985).

**Distributed Management**

Finally, IRM emphasizes that managing information system resources has become a major responsibility of the management of the organization at all levels, and in all functions. It is not the sole responsibility of an organization’s chief information officer and other IS executives. IRM is a general management responsibility, whether at the company, department, branch office, or functional area level. This is especially true as developments such as distributed processing, end user computing, departmental computing, and strategic information systems distribute the responsibility for developing, operating, and managing information systems out to all of an organization’s functional and work group managers (Sprague and McNurlin, 1986).

**A Multilevel Model**

We have organized the five components of this model into two levels with resource management, technology management and functional management forming the foundation that allows the organization to develop strategic management and distributed management capabilities. In describing the first three components as foundation components we are suggesting that these three components need to be managed effectively in order for strategic and distributed management capabilities to be developed. The first three components are also most directly the responsibility of the IS department, while strategic and distributed management heavily involve managers from all areas of the organization. Thus strategic and distributed management require a degree of sophistication and maturity (a la Nolan, 1979) in the organization’s use of computing that is beyond what is required for the first three components.

**An Empirical Analysis of Industry Acceptance of IRM Concepts**

The empirical component of this paper is designed to provide an analysis of industry acceptance and implementation of IRM concepts. During January and February of 1990, a mail survey and follow up mailing were sent to IS executives representing 87 companies and organizations in the Phoenix, Arizona area. All are members of the Society for Information Management. Thirty six usable responses were received representing a response rate of forty one percent.

The survey form used has three main components. The first section asks some general demographic questions, to be used for classifying responses and evaluating the representativeness of the sample. The second section asks respondents to evaluate a set of six concepts by indicating how central each of them is to the concept of IRM. The six concepts correspond to the five components of the multidimensional model of IRM proposed earlier in this paper, with the exception that the resource management component has been divided into two elements. The purpose of this section is to examine how industry practitioners see IRM, and to let us see which of the varied dimensions of IRM is most supported by industry practitioners. The third section of the survey asks respondents to indicate the status of their firms in implementing a number of actions and procedures which relate to various aspects of IRM. The purpose of this section is the evaluation of the extent to which IRM related management concepts have reached the implementation stage in
industry.

Analysis of Survey Results

Table 1 summarizes the demographic characteristics of the survey respondents. It is clear that the respondent group consists primarily of IS executives who are male, have been IS professionals for less than 10 years, and work for firms with over 1,000 employees and over 50 IS employees. Survey respondents come from a variety of industries and have varied educational backgrounds.

Table 2 summarizes respondent views of the various dimensions of the proposed multidimensional model of IRM. For each component or dimension, respondents were asked to indicate the extent to which that component is a related to the IRM concept as they understand it. The resource management component of the model was split into two elements for the purposes of the questionnaire, with respondents being asked to evaluate the extent to which management of data and information as a corporate resource is related to the IRM concept, and to separately evaluate the extent to which management of other IS elements as resources is related to the IRM concept.

Responses to this section of the survey indicate that the idea of managing information as a resource has the widest acceptance as a key component of IRM”. Three fourths of the respondents categorized management of information as a key component of IRM”.

### Table 1: Demographic Characteristics of Survey Respondents

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Category</th>
<th>Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years as an IS Professional</td>
<td>a. less than 10</td>
<td>26  72%</td>
</tr>
<tr>
<td></td>
<td>b. 10 to 20</td>
<td>7   19%</td>
</tr>
<tr>
<td></td>
<td>c. more than 20</td>
<td>3   8%</td>
</tr>
<tr>
<td>Formal education</td>
<td>a. less than 4 years of college</td>
<td>14  39%</td>
</tr>
<tr>
<td></td>
<td>b. undergraduate degree</td>
<td>8   22%</td>
</tr>
<tr>
<td></td>
<td>c. masters degree</td>
<td>13  36%</td>
</tr>
<tr>
<td></td>
<td>d. doctorate</td>
<td>1   3%</td>
</tr>
<tr>
<td>Sex</td>
<td>a. female</td>
<td>1  3%</td>
</tr>
<tr>
<td></td>
<td>b. male</td>
<td>35  97%</td>
</tr>
<tr>
<td>Current position</td>
<td>a. Information systems executive</td>
<td>30  83%</td>
</tr>
<tr>
<td></td>
<td>b. Information systems professional</td>
<td>5  14%</td>
</tr>
<tr>
<td></td>
<td>c. end user executive</td>
<td>1  3%</td>
</tr>
<tr>
<td></td>
<td>d. end user professional</td>
<td>0</td>
</tr>
<tr>
<td>Industry</td>
<td>Government</td>
<td>7  19%</td>
</tr>
<tr>
<td></td>
<td>Bus. Service</td>
<td>6  17%</td>
</tr>
<tr>
<td></td>
<td>Finance</td>
<td>6  17%</td>
</tr>
<tr>
<td></td>
<td>Health Services</td>
<td>4  11%</td>
</tr>
<tr>
<td></td>
<td>Trade - retail</td>
<td>3  8%</td>
</tr>
<tr>
<td></td>
<td>Communications</td>
<td>2  6%</td>
</tr>
<tr>
<td></td>
<td>Computer Mfg.</td>
<td>2  6%</td>
</tr>
<tr>
<td></td>
<td>Manufacturing</td>
<td>2  6%</td>
</tr>
<tr>
<td></td>
<td>Utilities</td>
<td>2  6%</td>
</tr>
<tr>
<td></td>
<td>Mining</td>
<td>1  3%</td>
</tr>
<tr>
<td></td>
<td>Transportation</td>
<td>1  3%</td>
</tr>
<tr>
<td>Firm/organization size</td>
<td>a. less than 50</td>
<td>3  8%</td>
</tr>
<tr>
<td></td>
<td>b. 50 to 200</td>
<td>2  6%</td>
</tr>
<tr>
<td></td>
<td>c. 200 to 1000</td>
<td>6  17%</td>
</tr>
<tr>
<td></td>
<td>d. over 1000</td>
<td>25  69%</td>
</tr>
<tr>
<td>IS department employees</td>
<td>a. less than 10</td>
<td>4  11%</td>
</tr>
<tr>
<td></td>
<td>b. 10 to 25</td>
<td>2  6%</td>
</tr>
<tr>
<td></td>
<td>c. 25 to 50</td>
<td>8  22%</td>
</tr>
<tr>
<td></td>
<td>d. more than 50</td>
<td>22  61%</td>
</tr>
</tbody>
</table>

Responses to this section of the survey indicate that the idea of managing information as a resource has the widest acceptance as a key component of IRM”. Three fourths of the respondents categorized management of information as a key component of IRM”.

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Based on your understanding of the concept of Information Resources Management, indicate the relationship of each of the types of management described below to IRM by circling the appropriate response.

1. Management of data and information as a corporate resource. (Component of Resource Management)
   A. A central element of IRM.  28  78%
   B. An important concept related to IRM.  7  19%
   C. Not a part of IRM.  1  3%

2. Management of hardware, software, and IS personnel as corporate resources. (Component of Resource Management)
   A. A central element of IRM.  17  47%
   B. An important concept related to IRM.  17  47%
   C. Not a part of IRM.  2  6%

3. Inclusion of information systems planning in the strategic planning process for the organization. (Strategic Management)
   A. A central element of IRM.  21  58%
   B. An important concept related to IRM.  15  42%
   C. Not a part of IRM.  0

4. Effective management of the IS department using management techniques similar to those used in other areas, such as management by objective, project management, and quality assurance. (Functional Management)
   A. A central element of IRM.  17  47%
   B. An important concept related to IRM.  15  42%
   C. Not a part of IRM.  4  11%

5. Effective management of the acquisition and use of new and emerging IS related technologies. (Technology Management)
   A. A central element of IRM.  17  47%
   B. An important concept related to IRM.  19  53%
   C. Not a part of IRM.  0

6. Extensive involvement by end user executives in the management of end user Information systems in their departments, and in information systems crucially affecting their departments. (Distributed Management)
   A. A central element of IRM.  18  50%
   B. An important concept related to IRM.  17  47%
   C. Not a part of IRM.  1  3%

Table 2: Respondent Evaluations of Dimensions of the Multidimensional IRM Model

corporate resource as “a central element of IRM.” However, there was widespread support of the other elements of the multidimensional model of IRM as well. Over half the respondents viewed involvement of IS planning in the strategic planning process of the organization as being “a central element of IRM” and each of the surveyed dimension was viewed as “a central component of IRM” by at least forty percent of the respondents. At the other extreme a maximum of twelve percent of the respondents felt that any of the listed concepts was not a part of IRM.

The third part of the survey addresses the extent to which firms have implemented a number of actions and procedures which can be related to the implementation of particular dimensions of IRM. Respondents were asked to react to a number of statements by indicating their degree to which they agreement or disagreement with each statement using a Likert scale response with five levels. The five response levels were: Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree.

Table 3 summarizes the responses to these statements. For each statement the distribution of responses is presented in both numeric and percentage Terms.

The results in Table 3 have not been formally grouped based upon the dimension of IRM to which they relate, and they should not be used
Based upon your understanding of operations within your organization, respond to each of the following statements. (SA - Strongly Agree, A - Agree, N - Neutral, D - Disagree, SD - strongly disagree)

<table>
<thead>
<tr>
<th>Statement</th>
<th>SA</th>
<th>A</th>
<th>N</th>
<th>D</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. In my organization there is a Chief Information Officer (CIO) who is responsible for the planning and overall management of the information services function.</td>
<td>7</td>
<td>19</td>
<td>4</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>1a. In my organization the CIO reports directly to the CEO.</td>
<td>10</td>
<td>9</td>
<td>2</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>2. Within the IS department there is a database administrator who is responsible for the establishment and enforcement of corporate wide policies and procedures to protect and share corporate data.</td>
<td>8</td>
<td>11</td>
<td>6</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>2a. The database administrator in my organization has responsibility and authority over all data bases containing general use organizational data.</td>
<td>7</td>
<td>10</td>
<td>4</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>3. My organization has an integrated telecommunications architecture which provides for all forms of telecommunications.</td>
<td>7</td>
<td>11</td>
<td>3</td>
<td>11</td>
<td>3</td>
</tr>
<tr>
<td>4. My organization has a systematic procedure for monitoring and evaluating new IS related technologies, and managing their introduction within the organization.</td>
<td>7</td>
<td>13</td>
<td>7</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>5. Within the IS department there is a group charged with the evaluation and introduction of emerging technologies.</td>
<td>5</td>
<td>7</td>
<td>4</td>
<td>15</td>
<td>4</td>
</tr>
<tr>
<td>6. The development of strategic opportunities for the use of information systems is an integral part of strategic planning in my organization.</td>
<td>5</td>
<td>16</td>
<td>3</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>7. The head of the IS department is extensively involved in the strategic planning process in my organization.</td>
<td>12</td>
<td>12</td>
<td>4</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>8. Top managers from functional areas outside of IS take an active part in planning information systems affecting their departments.</td>
<td>5</td>
<td>19</td>
<td>2</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>9. Managers from functional areas outside of IS take an active role in the management and control of end user systems developed by their staff.</td>
<td>2</td>
<td>19</td>
<td>4</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>10. My organization has an information systems steering committee with most of its membership coming from end user departments.</td>
<td>10</td>
<td>9</td>
<td>3</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>10a. Top management from end user departments takes an active role in the information systems steering committee.</td>
<td>9</td>
<td>9</td>
<td>5</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>11. End user departments have ultimate authority and responsibility for the purchase of PCs and other computer hardware and software used exclusively within their department.</td>
<td>1</td>
<td>9</td>
<td>5</td>
<td>16</td>
<td>4</td>
</tr>
</tbody>
</table>

| Table 3: Application of IRM In Respondents’ Organizations |
to assess the relative extent to which alternative dimensions of the multidimensional IRM model have been implemented. Some of the features described can be associated with more than one dimension, and some of the features require organizational structures which may be difficult for small and medium sized IS staffs to utilize.

The results in Table 3 do suggest that a variety of management activities and procedures associated with each of the dimensions of the multidimensional model of IRM are being utilized by a substantial proportion of the surveyed firms. The majority of respondents either strongly agreed or agreed with 16 out of 20 statements presented in this section of the survey. More than two-thirds of the respondents strongly agreed or agreed with the following six statements:

1. My organization has a CIO who is responsible for the planning and overall management of the IS function. - 74%

2. The head of the IS department is extensively involved in the strategic planning process in my organization. - 68%

3. Top managers from other functional areas take and active part in Planning information systems affecting their departments. - 68%

4. Management by objectives methods are used in the IS department - 68%

5. Project management techniques are used in the IS department. - 89%

5. Financial budgets are used in the IS department. - 89%

Summary

This paper presents a review of alternative views of the IRM concept. A multidimensional conceptual framework is proposed which encompasses major elements of several alternative views of IRM and incorporates them into a unified framework. The proposed framework divides IRM into five major dimensions: resource management, technology management, functional management, strategic management, and distributed management. The first three dimensions are seen as foundation concepts necessary to implement strategic and distributed management.

Industry response to various elements of this framework and industry implementation of IRM concepts has been assessed via a survey of IS...
executives. In general, the survey respondents agreed that each of the dimensions of the multidimensional model is “a central element of IRM” or “an important concept related to IRM.” The dimension most strongly supported was the concept of the management of information as a corporate resource, which three-fourths of the respondents felt was a central element of IRM. Responses to a set of statements relating to the implementation of procedures and activities associated with the various dimensions of the IRM model suggest that many firms are actively involved in implementing procedures and policies which can be associated with each of the dimensions of the model.

References


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