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Tor Guimaraes
Case Western Reserve University

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Tor Guimaraes
Weatherhead School of Management
Case Western Reserve University

ABSTRACT

The critical success factors (CSFs) of MIS managers have been previously studied by two authors using dramatically different approaches and producing different taxonomies. This study integrates these two taxonomies by mapping corresponding items and developing an expanded framework based on the originals. The new framework is used for MIS managers' ranking of CSFs by their level of importance. The results give interesting insights into MIS management priorities and suggest new research areas.

Introduction

The key areas where things must go right if the MIS department is to be considered successful have been called critical success factors (CSFs) (Martin, 1982; Rockart, 1982). Several benefits are expected from defining CSFs:

1. MIS managers can focus attention on the most important tasks and prioritize the investment of MIS resources.

2. The list of CSFs can be used as a basis for better communication between MIS managers and his/her subordinates and/or senior management.

3. MIS managers may use their CSFs as a vehicle for defining their information requirements (Martin, 1983).

4. Corporate managers may use CSFs as the basis to evaluate the performance of their MIS department.

5. MIS managers, in general, can use the list of CSFs identified by MIS managers in MIS leading-edge organizations as a preview of areas which may become important in their own organizations.

This study briefly discusses the relevant literature and modifies, integrates, and expands the list of CSFs previously defined. Finally, it ranks the items in the new CSF list in terms of their relative importance.

Previous CSF Work

There are two studies specifically identifying and analyzing the critical success factors of MIS managers (Rockart, 1982; Martin, 1982). These two studies have been used as the basis for this research.

THE ROCKART STUDY

Nine organizations considered to be outstanding in terms of MIS management were visited. For each organization a list of MIS CSFs was developed through interviews with top MIS managers, their superiors, immediate subordinates, and key users. The lists of CSFs cited by the MIS managers were found to be representative of the opinions of other people from the same organization. Table 1 presents the lists of CSFs for these nine companies.

Through an informal process of induction, Rockart used the company specific lists of CSFs to create a generalized set of four major CSFs. Based on Rockart's narrative description for each of these generic CSFs, this researcher extracted the generalized sub-CSFs which are listed in Table 2 under Rockart's corresponding generic CSFs.

THE MARTIN STUDY

Top MIS managers of fifteen large business and government organizations associated with the Indiana University

Table 1

Rockart's List of Information Systems Executive's CSFs

Company	Critical Success Factors
Company A: Railroad	1. Effective management of human resources 2. I/S priorities aligned with business 3. Delivery of service 4. Users (especially the CEO) having favorable perceptions of I/S 5. Continued direct reporting link to the CEO
Company B: Major Bank	1. Reliable, high quality I/S service 2. Communication of service quality and reliablity to top line 3. High quality I/S human resources 4. Ensuring I/S services evolves with needs/capabilities 5. One I/S executive in top management inner circle
Company C: High Technology Manufacturing	1. Successful implementation of two new key systems 2. Top management communication 3. Top management education 4. Meeting service standards 5. Human resources
Company D: Airline	1. Increased visibility for I/S within company 2. Good and better operating performance 3. More involvement in corporate planning process 4. IS morale 5. Downplay responding to users: increasingly taking leadership in helping user define information needs 6. Restructuring IS in line with new technology
Company E: Insurance	1. Maintaining top management user contact 2. Other top management to review I/S planning for approval and visibility 3. Providing planning role model for company 4. IS planning—IS leadership 5. Increasing user "direction" of I/S projects 6. Maintaining managerial perspective
Company F: Manufacturing	1. Retaining trained high quality personnel 2. Ability to interact with top management 3. Improving software/hardware 4. Enhancing job satisfaction for I/S personnel 5. I/S value perceived by organization 6. New I/S value perceived by organization 6. New I/S role communication to top management
Company H: Manufacturing	1. Attract, train, and retain high quality people 2. Plan effectively 3. Top management communication 4. Utilization of best productivity tools 5. Internal and external recognition of MIS 6. Support from top management 7. Decentralization of MIS function

Company I:	1. Involvement in mainstream application
Manufacturing	2. Involved, active, knowledgeable users
	3. Systems competence of people
	4. Effective, efficient systems
	5. High performance on perceived service levels

Table 2

Rockart's Generic CSFs

SERVICE

Effective/efficient operations.

Within-budget systems development.

High level of services perceived by users and top management.

TWO-WAY COMMUNICATION

User and top management education on MIS potential as business tool.

I/S HUMAN RESOURCES

Recruiting and retraining I/S personnel.

REPOSITIONING THE I/S FUNCTION.

Supporting user computing activities.

Integrating administration and control of computing resources.

Develop a progressing, capable image with users.

Expand MIS responsibility and authority to enable the repositioning above.

School of Business provided the basis for this study. A questionnaire was used to obtain a first cut set of CSFs. This questionnaire had three parts with the following objectives, respectively:

1. To assess the characteristics of the MIS managers, their departments, and their parent organization.

2. To establish a context for considering CSFs and to have the MIS managers list the objectives of their department.

3. To clearly explain the concept of CSFs and to collect the MIS managers' individual lists of CSFs with brief descriptions. While space was provided for 8 CSFs, MIS managers were instructed to list as many as they could identify.

The results from the group were summarized and returned to the managers for review. The managers were asked to fill out a second questionnaire for their revised list of CSFs and five made substantial changes. Based on Martin's narrative description for the major CSFs, sub-CSFs were extracted by this researcher. The result is presented in Table 3.

Research Method

The lists of CSFs identified by Martin and Rockart are the result of two very different methods of attaining the same objective, and as pointed out by Munro (1983), comparing alternative CSF lists may lead to some inconsistencies.

Table 3

Martin's List of MIS Directors Critical Success Factors

I. **System Development** (A3, B1, G4)
1. Project selection.
2. Effective project management.
3. Ability to respond effectively to user needs.
4. Development of reliable and cost effective application systems.

II. **Data Processing Operations** (A3, B1, D2, I4, F3, G4)
1. Controlling quality of reports: accuracy, relevancy, etc.
2. Control over downtime for on line systems.
3. Reasonable system availability to new users.
4. Reasonable response time of on line systems.
5. Controlling data security and privacy.

III. **Human Resource Development** (A1, B3, C5, G1, H1)
1. Effective recruiting.
2. Career development and retention of qualified MIS personnel. (D4, F1, F4, I3)

IV. **Management Control of the MIS/DP Organization** (F5, G3)
1. Effective MIS planning. (E4, H2)
2. Adherence to budgetary controls.
3. Adherence to standard policies/procedures.
4. Adherence to cost control measures.

V. **Relationship with Company Management** (B5, C2, E1, F2, G6, H3)

VI. **Supporting Company's Objectives/Priorities** (A2, D3, E3, G4)
1. Project selection and MIS resource allocation which reflects user and company priorities.

VII. **Management of Change** (B4, C4, E4, D6, H7)
1. Long range technology forecast and planned introduction to minimize disruption of company operations.

VIII. **Data Handled as Corporate Resource** (D6)
1. Central control over corporate data with at least central knowledge of departmental data resources.

IX. **Attitude of Service to Users** (G4)
1. Showing sensitivity to user needs.

These inconsistencies seem to be traceable to two factors: (1) lack of a common framework for MIS managers to express what they feel are their CSFs, and (2) lack of discrimination between two major types of CSFs. These types are: long term "universal" CSFs and short-term "firefighting" CSFs whose relative importance tends to change as the organization solves its problems and discovers new ones. A desirable goal for research in the CSF area is to develop a comprehensive framework.

The above discussion is a very superficial attempt at explaining inconsistencies between alternative CSF lists. The issue deserves much more attention, however it is considerably beyond the scope of this paper. Instead, to minimize any undesirable influence from these inconsistencies, this study attempts to develop an all-inclusive new CSF list before having MIS managers rank the CSFs. Martin's list of CSFs is used as the starting point and Rockart's company-specific CSFs are used to expand it.

Table 4

Mapping the New Framework to Rockart's CSF List

Companies A- I and Their Critical Success Factors

A1. Effective management of human resources (III)
A2. I/S priorities aligned with business (VI)
A3. Delivery of service (I, II, X)
A4. Users—especially the CEO—having favorable perceptions of I/S (V2)
A5. Continued direct reporting link to the CEO (V1, V3)

B1. Reliable, high quality I/S service (I, II, X)
B2. Communication of service quality and reliablity to top line (V2, V3)
B3. High quality I/S human resources (III)
B4. Ensuring I/S services evolves with needs capabilities (I, II, VII combined)
B5. One I/S executive in top management inner circle (V1, V3)

C1. Successful implementation of two new key systems (VII for any key system)
C2. Top management communication (V)
C3. Top management education (V3)
C4. Meeting service standards (I, II, X)
C5. Human resources (III)

D1. Increased visibility for I/S within company
D2. Good and better operating performance (II)
D3. More involvement in corporate planning process (VI)
D4. IS morale (III2)
D5. Downplay responding to users: increasingly taking leadership in helping user define information needs (X5, IV1)
D6. Restructuring IS in line with new technology (VII)

E1. Maintaining top management user contact (V)
E2. Other top management to review I/S planning for approval/visibility (V1, V3)
E3. Providing planning role model for company
E4. IS planning—IS leadership (IV1)

E5. Increasing user "direction" of I/S projects (IX3)
E6. Maintaining managerial perspective (V3)

F1. Retaining trained high quality personnel (III2)
F2. Ability to interact with top management (V)
F3. Improving software/hardware
F4. Enhancing job satisfaction for I/S personnel (III2)
F5. Improving management control (IV)

G1. High quality personnel (III)
G2. User and top management satisfaction and involvement (V2)
G3. Efficient use of human resources
G4. Service levels (actual and perceived)
G5. I/S value perceived by organization (V2)
G6. New I/S role communication to top management (V)

H1. Attract, train, and retain high quality people (III)
H2. Plan effectively (IV1)
H3. Top management communication (V)
H4. Utilization of best productivity tools
H5. Internal and external recognition of MIS
H6. Support from top management (VI)
H7. Decentralization of MIS function

I1. Involvement in mainstream application
I2. Involved, active, knowledgeable users (IX3, X1)
I3. Systems competence of people (III2)
I4. Effective, efficient systems (II)
I5. High performance on perceived service levels

NOTE: New framework items are within parentheses.

INTEGRATING THE FRAMEWORKS

Martin's list of CSFs was chosen as the basis for building the expanded framework because it uses more traditional terminology and has previously been used as basis for communication with MIS managers.

Rockart's list of CSFs for the nine organizations (See Table 4), contain CSFs which represent state-of-the-art MIS issues. They are important contributions from the MIS managers of leading-edge organizations.

One problem integrating the CSF lists was that this researcher could not map Rockart's item H4—utilization of best productivity tools—into Martin's CSF framework and also could not justify, in his own mind, the addition of such a general factor to the new framework. All mappings strictly represent the researcher's judgement. The following steps were followed to accomplish the CSF mappings:

1. Each CSF identified by Rockart (see Table 1) has been uniquely identified (coded) using its company's letter and the number assigned by Rockart. The CSF codes have been written in parentheses next to the corresponding CSFs in Martin's framework, as shown in Table 3.

2. After Martin's CSF list was expanded, its major CSFs were indentified with roman numerals. The particular CSF subitems were identified with a number attached to the roman numeral. The CSF codes were written in parentheses next to the corresponding CSF in Rockart's list, as presented in Table 4.

3. The codes for the CSFs in Rockart's list have been written in parentheses next to the corresponding CSF in the expanded CSF list, as presented in Table 5.

DEVELOPING A NEW FRAMEWORK

In an effort to further expand the list of CSFs, a preliminary version of Table 5 was distributed to 33 MIS managers attending a seminar. These managers are from organizations with gross revenues ranging from $100 million to several billion dollars and are from many different industries. About half of the managers were below the top computer executive in their organization. These managers were considered to be good representatives of MIS management, in general, and the diversity of their company backgrounds was useful in this case since the task at hand was to develop a comprehensive list. Comprehensive in the sense that it should include all of Martin's CSFs, all of Rockart's CSFs, plus any other major item or subitem which was thought applicable.

Using the preliminary version of Table 5 as the starting point, these managers were asked to first identify any major areas which may have been neglected. Then they were asked to identify any sub items for the major CSFs. Additions to the list occurred after discussion and common agreement. No major CSF were added, however, the following subitems were added: IX1 and 2; X2, 3, 4, 5, and 6. The resulting new list of CSFs is presented in Table 6.

RANKING THE CRITICAL TASKS

The new CSF list was converted into a questionnaire used for MIS managers to rank the CSF items. First the managers were asked to rank the major CSFs, then the sub-items under each major CSF were ranked. Ranking was done through the forced distribution of one hundred points among the items to be ranked. MIS managers were also encouraged to add items to the list as they saw fit, however, no new items were added.

Two groups of MIS managers were used to rank the new list of CSFs:

1. Forty-eight top MIS managers attending MIS courses and seminars. (This is a different group from the one used to develop the new CSF framework discussed above.)

2. Thirty-nine top MIS managers who responded to a questionnaire mailed to 200 organizations randomly selected from the Fortune 1000 list (industrial and service).

The random sample (second group) was judged important because the first group was suspected of being heavily influenced by the researcher. Also, the second group is comprised solely of very large organizations while the first group is dominated by companies with less than $300 million gross revenues. Possible non-response bias associated with the random sample has not been evaluated with a survey of non-respondents, however no bias is apparent in terms of company dollar sales or frequency of industrial versus service.

Study Results

Chi-square measures of the two groups expectedly indicate significant group differences in terms of company gross revenue and EDP/MIS department budget. However, the use of multivariate analysis of variance revealed no significant differences between the CSF rankings for the two groups. Therefore, the groups were merged for the calculation of CSF ranking statistics. For each major CSF and each subitem under the major CSF, the ranking average (arithmetic mean), range, and standard deviation was computed (Tables 6 and 7).

Table 5

A New Framework for Critical MIS Tasks
(Related Rockart CSF items are within parentheses)

I. **System Development** (A3, B1, G4)
   1. Project selection.
   2. Effective project management.
   3. Ability to respond effectively to user needs.
   4. Development of reliable and cost effective application systems.

II. **Data Processing Operations** (A3, B1, D2, I4, F3, G4)
   1. Controlling quality of reports: accuracy, relevancy, etc.
   2. Control over downtime for online systems.
   3. Reasonable system availability to new users.
   4. Reasonable response time of online systems.
   5. Controlling data security and privacy.

III. **Human Resource Development** (A1, B3, C5, G1, H1)
   1. Effective recruiting.
   2. Career development and retention of qualified MIS personnel (D4, F1, F4, I3).

IV. **Management Control of the MIS/DP Organization** (F5, G3)
   1. Effective MIS planning (E4, H2).
   2. Adherence to budgetary controls.
   3. Adherence to standard policies/procedures.
   4. Adherence to cost control measures.

V. **Relationship with Company Management** (B5, C2, E1, F2, G6, H3)
   1. Senior Management support (A5, E2, H6).
   2. Senior Management satisfaction (A4, B2, G2, G5).
   3. Ability to communicate in user management terms (A5, B2, C3, D1, E2, E4, E6).
   4. Cultivating good MIS department image with users (D1, H5, I5).

VI. **Supporting Company's Objectives/Priorities** (A2, D3, E3, G4)
   1. Project selection and MIS resource allocation which reflects company priorities.

VII. **Management of Change** (B4, C4, E4, D6, H7)
   1. Long range technology forecast and planned introduction to minimize
      disruption of company operations.

VIII. **Data Handled as Corporate Resource** (D6)
   1. Central control over corporate data with at least central knowledge of
      departmental data resources.

IX. **Attitude of Service to Users** (G4)
   1. Courteous treatment of users by MIS personnel.
   2. Quick feedback to users about MIS activities affecting them.
   3. Cultivating user involvement in project development, project management,
      other MIS activities affecting them (E5, I2).
   4. Showing sensitivity to user problems.
   5. Cultivating good MIS department image with senior management.

(Continued on next page)

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X. **User Computing Support and Management** (A3, B1, D6, G4, I1)
1. Supporting user training and education (I2).
2. Having a full time "Help Desk."
3. Advising on the selection and acquisition of computing equipment.
4. Controlling user access to corporate data resources.
5. Facilitating user access to corporate and external data resources.
6. Helping user information needs definition.

Table 6

Rankings for the Major CSFs

Major Critical Success Factor	Average # of points*	Range	Standard Deviation*
—System development	13.0	4-20	5.4
—Data processing operations	11.3	2-20	6.2
—Human resource development	7.2	2-15	4.1
—Management control of the MIS	6.3	2-15	3.6
—Relationship with company management	12.0	3-25	6.1
—Supporting company's objectives and priorities	10.4	0-30	8.2
—Management of change	7.3	2-15	3.3
—Data handled as corporate resource	6.0	0-15	3.7
—Attitude of service to users	12.4	7-25	4.7
—User computing support and management	10.3	2-40	8.8
	100.0		

*Rounded to the nearest decimal.

RESULTS FROM MAJOR CSF RANKINGS

The data shown in Table 6 show the major CSFs falling into two categories: those whose average rankings are above 10.0 points, and those whose average rankings are below 10.0 points.

All the CSFs with average rankings above 10.0 (systems development, DP operations, relating to company management, supporting company's objectives and priorities, attitude of service to users, and user computing support and management) are amenable to short-term performance evaluation. The other CSFs (human resource development, MIS management control, management of change, and handling data as a corporate resource) have a more long-term and abstract nature;

evaluating their performance is more difficult. This dicotomy indicates that MIS managers are more preoccupied with immediate problem areas. The CSFs with long-term implications are relatively less important in their minds.

The great variety of rankings of CSFs which one would expect all MIS managers to be concerned with (DP operations, supporting company objectives and priorities, etc), is rather surprising. Again, the only explanation for the relatively large difference of opinion among MIS managers is that they tend to think in terms of problems which are most important to them at the moment. Therefore MIS managers from different companies would tend to generate different CSF lists and to rank

Table 7

Rankings of Items Under Each Major CSF

System Development	Average # of points*	Range	Standard Deviation*
—Project selection	19.6	5-50	11.8
—Effective project management	20.2	10-30	5.6
—Ability to respond effectively to user needs within a reasonable time frame	31.9	20-50	10.2
—Development of reliable and cost effective application systems	28.3	10-50	8.2
	100.0		

Operations			
—Controlling quality of reports	15.7	10-30	6.0
—Control over downtime for online systems	21.2	10-30	7.2
—Reasonable system availability to new users	17.3	5-25	5.4
—Reasonable response time for online systems	21.4	10-30	7.2
—Controlling data security and privacy	24.4	10-50	12.7
	100.0		

Human Resource			
—Effective recruiting	28.3	10-60	15.2
—Career development and retention of qualified MIS personnel	71.7	40-90	15.2
	100.0		

Management Control			
—Effective MIS planning	39.4	15-70	14.8
—Adherence to budetary controls	20.0	5-30	8.0
—Adherence to standard policies and procedures	23.4	10-60	12.8
—Adherence to cost control measures	17.2	0-30	8.1
	100.0		

Relationship with Company Management			
—Cultivating senior management support	23.0	10-40	6.7
—Ensuring senior management satisfaction	23.2	10-30	6.2
—Developing the ability to communicate in user management terms	19.4	10-40	9.0
—Cultivating favorable senior management perception of MIS activities, developing a good MIS department image	34.4	25-50	8.2
	100.0		

*Rounded to the nearest decimal.

Table 7

Rankings of Items Under Each Major CSF (Continued)

Attitude of Service to Users	Average # of points*	Range	Standard Deviation*
— Courteous treatment of users by MIS personnel	18.2	10-25	4.4
— Quick feedback to users about MIS activities affecting them	15.8	10-30	5.1
— Cultivating user involvement in project development, project management, other MIS activities affecting them	23.8	20-50	7.4
— Developing sensitivity to user problems	19.0	0-40	7.9
— Cultivating favorable user perception of MIS activities, developing a good MIS department image	23.2	10-40	7.8
	100.0		

User Computing Support and Management	Average # of points*	Range	Standard Deviation*
— User training and education	18.2	10-30	5.1
— Having a "Help Desk"	13.1	0-30	7.8
— Advising the selection and acquisition of computers by users	12.0	5-30	6.8
— Controlling the selection and acquisition of computers by users	11.4	5-30	6.7
— Facilitating user access to corporate data resources	15.4	5-30	6.8
— Controlling user access to corporate data resources	11.2	5-25	5.5
— Helping users define their information needs	18.6	10-40	8.0
	100.0		

*Rounded to the nearest decimal.

CSFs in different order than the rankings of MIS managers in different situations.

RANKINGS OF ITEMS UNDER EACH MAJOR CSF

Inspection of Table 7 also reveals very large difference of opinion on the relative importance of the items under each major CSF. The explanation above is applicable in this case.

— The ability to respond effectively to user needs within a reasonable time frame, and being able to develop reliable and cost effective applica-tions are the two most important activities within the area of systems development.

— In the operations area the difference in relative importance for the subitems is overshadowed by the large difference of opinion among the MIS managers.

— In human resource management it is clear that MIS Managers, in general, assign greater importance to career development and reten-tion of qualified MIS personnel as compared to activities for the recruitment of new people. One could attempt to explain this preference in terms of economic conditions, political

pressure from within the organization, organization policy, etc. These represent interesting questions which warrant further research.

— Effective MIS planning is generally considered to be the most important task within the MIS management and control area.

— Cultivating favorable senior management perception of MIS activities (a favorable image) is considered the most important activity in the relationship between MIS managers and company managers.

— Cultivating user involvement in project development and management is considered the most important task in showing an attitude of service to the user community. It is followed closely by activities aimed at cultivating a good MIS department image with the users.

— Helping users define their information requirements, closely followed by user training and education, are considered the most important factors for supporting and managing user computing.

Conclusions and Recommendations for Research

To accomplish the expected benefits outlined in the beginning of this report further work in the area of CSFs is necessary. To eliminate the problem of inconsistent CSF lists continued effort is needed to develop a comprehensive list to be generally used for research purposes. Such a list will be a useful tool for communication with MIS managers and will facilitate comparisons of CSF rankings by different managers. Whenever possible traditional terminology should be used.

The identificiation of company-specific CSFs will continue to be important for at least two reasons:

1. To identify new items for addition to the comprehensive CSF list.

2. As case studies, useful to explain the reasons for shifts in CSF rankings.

Essential to the development of prescriptive power for the CSF framework is a better understanding of the determinants of CSF rankings. For example, research is needed to understand the impact of personal computing on CSF shifts. Other likely determinants of CSF ranking differences is the presence of information centers, the position of MIS manager in the organizational structure, the MIS department age and sophistication, etc.

Also of vital importance to MIS managers would be research on the relationship between CSF rankings and the level of senior management satisfaction with their department, along with the user community's level of satisfaction.

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