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## Article

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# MIS problems in a batch processing environment

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Performance measures like profits are an important criterion for evaluating the success of computer-based management information systems. However, the study of performance of a computer-based information system is difficult because of measurement problems and a large number of variables which affect performance. Many technically well-designed systems have failed to achieve their objectives or to work at all, because important factors which can contribute substantially to the success of an MIS were ignored. Based on a research project carried out in a large organization where the computer-based systems operate on a batch data processing system, this paper discusses some of the major problems which can lead to the total failure of an MIS.

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Wanneer die werkverrigting van 'n rekenaargebaseerde bestuursinligtingstelsel evalueer word, is maatstawwe soos wins belangrik. In die geval van 'n BIS is die evaluering egter baie gekompliseerd as gevolg van metingsprobleme en 'n groot aantal veranderlikes wat die werkverrigting beïnvloed. 'n Groot aantal tegniese-goed-ontwerpte stelsels het al in die verlede misluk omdat belangrike faktore, wat 'n bydrae tot die sukses van die stelsels lewer, geïgnoreer is. Hierdie artikel is gebaseer op 'n navorsingsprojek wat uitgevoer is in 'n groot organisasie waar die gerekenariseerde stelsels op 'n bondelverwerkingswyse bedryf word. 'n Aantal belangrike faktore wat tot die totale mislukking van 'n rekenaargebaseerde bestuursinligtingstelsel kan lei, word geïdentifiseer en bespreek.

*S.-Afr. Tydskr. Bedryfsl.* 1983, 14: 172 - 175

## Introduction

A number of technical and management problems which can result in the failure of a computer-based MIS have been reported.<sup>1,2,3,4</sup> In a previous research project<sup>5</sup> it was found that factors like user involvement in the development of a computer-based MIS, personal factors and the attitude of the user towards computerization (managers included) are directly related to the success of a computer-based MIS.

Although technical quality of a computer-based system is of utmost importance to achieve a satisfactory level of success, too often the emphasis placed upon this aspect is too high while other important factors are left out of account. Unfortunately technical qualities like the quality of the hardware and software, programming techniques, file handling techniques etc., are only necessary but not sufficient conditions for a MIS to be successful. Too often the acquisition of equipment, upgrading of the existing system or the acquisition of a completely new hardware and software system have been seen as the solution to all of the MIS problems in the organization.

In this research project, the management of a rather large organization in South Africa suffered major MIS problems. By making use of questionnaire data were collected from the managers as well as from the low-level clerical users of the computer-based systems. An evaluation method was used in order to be able to:

- (a) determine what the major problems are;
- (b) find the reasons for these problems;
- (c) find possible solutions for these problems.

In the investigation interviews were held with all the managers in the organization while statistical techniques were used to process and analyse the data collected.

## Background

In this specific organization a computer system was purchased about 15 years ago. At that time the computer could be classified as a large system. The same system is still in use and its capabilities are not much more than that of some of the mini-computers available today. At the moment they are running about 10 commercial applications on this system. These applications include salaries and wages, inventory control, invoicing, production control, etc. The systems were developed over the years and all are operating on a batch fashion.

As is the case with many organizations, the data processing department originated in one of the functional areas. In this case it was the financial department. Ten years ago the organization was rather small; it has now grown into a very large organization with the corresponding data processing and

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management information needs. The data processing department on the other hand, has not kept pace with this growth — so much so that no new developments can take place.

With regard to the organizational structure, the data processing department stayed where it was — in other words low in the structure with no managerial power. The department itself has no structure at all. The only structure is the fact that there is a head of the department and all of the 25 personnel report to him. Most of these personnel are data capturing personnel with only two application programmers and two operators.

### Field study

The investigation took place in two phases, because it was clear that there was a need for management information in the organization. Firstly interviews were held with all the managers that were using management information and all of those who might need it in future. Secondly, data were collected from the managers and from the clerical users of the systems. This was done by means of questionnaires in which the same type of questions were used as in a previous research project.<sup>6</sup> Sixteen managers and 54 clerical users were involved in the investigation.

### Collection of data

Two different questionnaires were used — one for the managers and the other one for the clerical users. The reason for this is obvious — the use of computer-based systems differs substantially for these two groups of users. Most of the questions in the questionnaires could be answered on a seven-point scale. This scale was used with great success in previous research projects.<sup>7,8</sup> It is also directly related to the capabilities of the human being as an information processor.<sup>9</sup> The questions are put in such a way that most problems or problem areas could be identified by processing this data. Each of the questionnaires contains approximately 50 questions and selections of questions with abbreviations of the corresponding variables are given in Appendix A and Appendix B.

### Measurement of success

The main purpose of the research project was to search for important variables or for factors contributing most to the success of the systems. It was further decided to use a user criterion for the success of the various systems. How is success defined operationally? In past studies success was measured by a number of indicators including actual use, intended use, attitudes, etc.

A cost/benefit study is one of the best ways to measure success. The benefits obtained from a computer-based system should exceed the costs of developing and running the system. However, it is extremely difficult to measure success through cost/benefit studies and some other indicator of success is needed.

The most appealing indicator from a measurement standpoint is system use. There are instances where a high level of system use is not a sign of success of the system. When the use of a computer-based system is involuntary, this criterion cannot be used. In this project the use of the system (variable USE) was used as a criterion for users in the processing of the data from the managers.

It is clear that the same criterion could not be used in the processing of the data from the clerical users. For the clerical data the criterion used was user satisfaction (variable SATISFY) with the systems. Use and satisfaction are relative,

that is, they are measured in general on a continuous scale as opposed to a binary scale. Less and more satisfaction are then defined operationally by where individuals fall on the continuous scale.

### The statistical analysis of the data

By means of the BMDP statistical program package<sup>10</sup> the information obtained from the questionnaires was analysed. In order to reduce the number of variables which were contained in the different questions of the questionnaires, cluster analyses were used. This method consists of the clustering of variables into groups where similarities (measured by intercorrelations) exist. Selection of one or at most two variables per group had the effect that a representative subset among all the possible variables was obtained. The BMDPIM-program was used for both data sets which resulted in the subsets of variables in Table 1 (see appendices A and B for full description of the questions from which the variables originated).

**Table 1** Selected variables by cluster analysis

Managers	Users	
DELIVER	IMPORTANT	WORKYEARS
ONTIME	ACCURATE	NO DOCUMENT
USEFUL	USELESS	INACCURATE
DOCUMENT	OUTPUT	CONTACT
DETAIL	PEOPLE	NEVERBEGIN
FORMAT	REQUIRE	
DISPENSABLE	QUALITY	
DECIDE	COMPDEPT	
SYMPATHY	SCHEDULE	
TRAIN	NEWDEVELOP	

The second step in the analysis was to try to explain the success of the system by an appropriate subset of variables. For the managers success was measured by the dependent variable USE, while in the user's case by SATISFY. In applying multiple regression analysis through the BMDP9R-program, it was easy to search through all possible subsets of various sizes of the variables in Table 1 in order to obtain sets of variables which best explain the dependent variables. The measure of explanation which was used here was the proportion of the total variance of the dependent variable due to a linear combination of a given set of variables, also known as the squared multiple correlation coefficient ( $R^2$ ). Since the number of variables in the set gave rise to an upward bias in  $R^2$ , the adjusted  $R^2(R_a^2)$  which took this phenomenon into account, was more appropriate. The subsets of variables which maximized the  $R_a^2$  in both the data sets were consequently selected to be the best in explaining the dependent variables. Table 2 gives these subsets together with  $R_a^2$ -values and also the relative contributions of each variable to the total variances of the dependent variables. These contributions to  $R^2$  for each variable are the amount by which  $R^2$  would be reduced if that variable was removed from the set of variables under consideration.

In conclusion the user's data were submitted to a residual analysis, in order to locate reasons for the poor explanation which the selected variables gave for the dependent variable. From this analysis it was apparent that the group of personnel using the creditor and/or product systems on the computer

**Table 2** Sets of variables which best explain the success of the system

Managers		Users	
Variable	Contribution	Variable	Contribution
TRAIN	0,1377	OUTPUT	0,1405
DETAIL	0,1006	INACCURATE	0,0835
SYMPATHY	0,0480	CONTACT	0,0432
DISPENSABLE	0,0462	QUALITY	0,0284
ONTIME	0,0417	USELESS	0,0257
DECIDE	0,0135		
$R_a^2 = 0,8469$		$R_a^2 = 0,3102$	
Dependent variable: USE		Dependent variable: SATISFY	

gave rise to poor explanations of the dependent variable (SATISFY). Another factor which seemed to be of influence in the explanation of SATISFY was that users who rated SATISFY as 1 on the seven-point scale deviated from the other personnel.

Apart from the relative important variables in Table 2 which explained the dependent variables the best, the user's success criterion SATISFY cannot generally be described equally well for the whole group. Personnel using creditor or product systems or who were extremely dissatisfied with computerized systems deviated from the general conclusions. To cope with these groups, a separate set of variables which gave an appropriate explanation of SATISFY had to be located. The same techniques as before resulted in essentially the same set of variables but with the variable QUALITY substituted by NEVERBEGIN. In this case the proportion of variance described by the chosen set of variables was 0,3600 (in comparison with  $R_a^2 = 0,3102$  for the whole group).

## Discussion of the results

### Managers

From the results obtained it was clear that the quality of the information received by the managers was of utmost importance with regard to the usefulness of the information. Not less than three of the six variables explaining the success of the system were contained in the best subset namely DISPENSABLE, DETAIL, and ONTIME. If output reports contained too much detail they could be of no use to the manager. In this specific project it was found that some of the managers received output reports of approximately 300 pages!

An information interval was defined as the interval between reports. For weekly reports, the information interval was one week; for monthly reports, one month. The reporting delay was defined as the processing delay between the end of the information interval and the issuance of the report for management use. In this project it was clear that the processing delay was an important factor with regard to the usefulness of the reports.

The other important factors were TRAIN, (training provided for users), SYMPATHY (sympathy from the information systems personnel for the problems that users have to deal with) and DECIDE (the usefulness of computer output in the decision-making process).

An organization will always suffer severe MIS problems if there are no effective training programs for the users of computer-based systems. The same could be said for the non-existence of procedures or mechanisms where users are directly

involved in any computerization effort.

### Clerical users

The variables contained in the last subset which explain the success of the systems from the clerical viewpoint are OUTPUT, INACCURATE, CONTACT, QUALITY and USELESS (see Table 2 and Appendix B).

The poor quality of the output and the failure of the system was caused by the fact that the clerical staff were not involved in the design of the output forms and reports nor in the contents of such reports. It is essential that users should be involved in the development of a computer-based system. Previous research results<sup>11,12</sup> confirmed this. The same argument held for the variable INACCURATE which was directly related to the input forms. The third variable was applicable as well because contact with information systems staff was quite important. Serious attitude problems may arise if there are no procedures and structures in an organization for users to make formal contact with information system personnel.

From the clerical users point of view it seems very important that the overall quality of the computer-based system they are using should be sufficiently high. This is directly related to the last variable, USELESS, where the usefulness of the information is at stake.

## Conclusions

In this research project the research was done in an organization where the MIS was operating in a batch processing environment. There was reason to believe that most of the MIS problems that could be identified, were caused by a few basic principles which were not followed, and by a few primary problems that gave rise to the situation. Consider the following:

- The structure of the organization is of such a nature that the information services activities are at a rather low level. The result of this is that data processing staff have no vote in top managements decisions with regard to the development of a Management information system. The fact that no communication channel exists in the organization through which user requests can be handled gives rise to many of the problems identified.
- A second rather basic problem is the fact that there is a great shortage of skilled computer personnel. No new developments can be undertaken and this causes frustration in the user departments.
- The fact that no structure exists to include the information services department itself could be a reason for quite a few of the problems. The non-availability of information and the processing delays are examples.
- No procedures or mechanisms exist within the organization to ensure the involvement of users in computerizing projects. No responsibility is given to the user department with regard to a computer-based system in order to develop it in co-ordination with the information services department.

To conclude, the problems in a MIS are sometimes of such a nature that they could lead to the total failure of the system. Sometimes primary problems could be the reason as was found to be the case in this project.

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**Appendix A**

**Managerial questionnaire (subset of questions)**

**1. TRAIN**

My impression of the computer personnel is that they provide no training 1 2 3 4 5 6 7 provide training for users

**2. DETAIL**

The information I receive from the computer to support me in my decision-making contains too much detail 1 2 3 4 5 6 7 contains the exact amount of information

**3. SYMPATHY**

My impression of the computer personnel is that they are unsympathetic to my problems 1 2 3 4 5 6 7 they are sympathetic to my problems

**4. DISPENSABLE**

The information I receive from the computer to support me in my decision-making is dispensable 1 2 3 4 5 6 7 indispensable

**5. ONTIME**

The information I receive from the computer to support me in my decision-making is not in time 1 2 3 4 5 6 7 in time

**6. DECIDE**

By means of computerization it is possible to make decisions otherwise impossible to make disagree 1 2 3 4 5 6 agree

**Appendix B**

**Clerical Questionnaire (subset of questions)**

**1. OUTPUT**

I am not satisfied with the output I receive from the computer 1 2 3 4 5 6 7 I am satisfied with the output I receive from the computer

**2. INACCURATE**

To what extent do you feel the input you are preparing for the computer are accurate or inaccurate? inaccurate 1 2 3 4 5 6 7 accurate

**3. CONTACT**

Using the computerized system in my department I have no contact with the computer department 1 2 3 4 5 6 7 contact with the computer department

**4. QUALITY**

The quality of the computerized system I am using is, to my opinion, low 1 2 3 4 5 6 7 high

**5. USELESS**

To what extent is the output you are receiving from the computer department useful or useless? useless 1 2 3 4 5 6 7 useful

**6. NEVERBEGIN**

My organization should never have used computers disagree 1 2 3 4 5 6 7 agree