Planning for CIM in Hungary: Facts about and attitudes to implementation

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Abstract: The paper is on the implementation of computer-based production systems. Its purpose is twofold: on one hand it tries to give facts about the level and nature of the implementation of such systems in Hungary compared with the results of a similar survey carried out in the EEC nations. On the other hand it focuses on the human factors of implementation, namely it analyses the factors of acceptance and refusal of these projects in five selected companies using an attitude questionnaire.

Keywords: Implementation, practice

Introduction

During the last two decades the role of production has dramatically changed and has become a competitive weapon of the companies. Skinner (1978) put it as the basic element of corporate strategy, Wight (1984) emphasized that “Production is the primary source of wealth” and both of them considered production as an interaction of human and technical elements.

The rapid changes in technology and management have not affected all the countries to the same degree. There are considerable differences between developing countries and industrialized nations. As Goonatilake (1987) writes: “Many industries in developing countries, even after mastering the technology fail to produce the quantity of products at acceptable quality levels. Problems such as low product quality, low productivity and failure to meet delivery schedules are endemic features in the industrialized sector in developing countries”.

Although the above mentioned phenomena are not unknown in Hungary we are a little bit ahead: some Hungarian companies are trying to implement the latest CAD/CAM systems. In this sense Hungary is somewhere between the industrialized and the developing countries.

The purpose of this paper is twofold: on one hand it tries to give some information on the trends followed by the Hungarian companies. From this point of view it tries to give facts on a specific area of development, namely it analyses the characteristics of the computerization in Hungary compared with the results of a similar survey carried out in the EEC countries.

On the other hand I think that the implementation of a computer-based production control system involves both hard (structural) and soft (attitudinal) aspects and unfortunately quite often the technical factors dominate and the latter tend to be neglected not only in the literature but by the practitioners, too. That is why the paper focuses on the human factors of implementation. It analyses the data of 174 attitude questionnaires filled out in five major Hungarian companies. All these five companies have been in the process of implementing a new computer based production control system which has affected the employees in many ways. This paper is mainly on how the employees evaluated the implementation process from their point of view.

Some managers may think that human behaviour which is the major source of uncertainty...
The respondents were asked: (a) to indicate on a five point scale to what extent these information systems are computerized (the scale ranged from not at all to a fully computerized system); (b) to indicate on a 12 by 12 triangular matrix which pairs of computerized subsystems or databases they have integrated or intend to integrate over the next two years.

The 12 computerized subsystems, which were submitted to the representatives of the companies were:

1. Sales planning and forecasting.
2. Inventory status.
3. MRP/MPS.
4. Shop floor control.
5. Design engineering (including CAD).
6. Manufacturing engineering (including CAM).
7. Process controls.
8. Quality reporting.
9. Accounting.
10. Order entry.
11. Purchasing.

In order to get a better insight into the implementation process 5 major companies were chosen from the sample. The purpose of this selection was to analyze the methods used by the best ones. Studying their behaviour might show the potential paths to follow or the potential traps to avoid for the companies working in a situation similar to the Hungarian one. Moreover, this analysis—which is a descriptive one—may help in determining how to do the implementation under such circumstances.

The selected companies are well-known in the Hungarian industry and used some kind of sophisticated and more or less integrated computer systems. All these 5 companies have recently implemented or are in the process of implementing a new computer-based production control system and they might be considered as a selected group from the elite of the Hungarian industry. They are in a monopolistic position in the Hungarian market and have wide international contacts, too. On general they are above the average Hungarian level especially in computerized production management. In the following I will call the group of these five companies a 'selected' group. Table 2 shows their characteristics.

After having grouped the sample into two subsamples (the selected group and the others)
Table 2
The main characteristics of the selected companies (in 1986)

<table>
<thead>
<tr>
<th>Name</th>
<th>Number of employees</th>
<th>Turnover (million Ft)</th>
<th>Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>11750</td>
<td>18500</td>
<td>Iron mill products</td>
</tr>
<tr>
<td>II</td>
<td>7147</td>
<td>6316</td>
<td>Ships, cranes</td>
</tr>
<tr>
<td>III</td>
<td>4634</td>
<td>4430</td>
<td>Machine-tools</td>
</tr>
<tr>
<td>IV</td>
<td>4500</td>
<td>3700</td>
<td>Telephone centres</td>
</tr>
<tr>
<td>V</td>
<td>5600</td>
<td>5059</td>
<td>TV sets</td>
</tr>
</tbody>
</table>

* 1 US$ equals to about 50 Hungarian Ft.

The main characteristics of the selected companies compared the degree of computerization of the databases and systems with the data of 166 European companies. The data on the European companies are from De Meyer (1987).

Table 3 lists the degree of computerization in the above mentioned three groups and the numbers indicate groups of databases or subsystems which are significantly different in rank order in the European companies based on Wilcoxon matched-paired signed-rank test (2-tailed 1% significance level).

It seems at first sight from Table 3 that using computerization level as a variable the Hungarian companies can not be categorized into the same groups as the European ones. The analysis of Table 3 gives the following conclusions:

(i) On the whole the level of computerization is lower in the Hungarian companies than in the European ones. The distance between the European and the selected Hungarian companies is less than the distance between the two Hungarian groups.

(ii) The structure of grouping of subsystems or databases is different in the different classes of companies. There are such subsystems which are independent of the type of economy (planned or market economy) and require only a certain level of development. Accounting and inventory status are computerized usually for the first time.

(iii) It is not a surprise to find quality reporting and sales planning in the last places in the Hungarian companies because this is a logical consequence of a seller's market. In a shortage economy the problem is (because of the shortage of goods, raw materials, equipment etc.) how to produce and not how to sell.

(iv) The high ranking of CAD systems in the SH class is due to the recent heavy investment in this field.

In the second place the respondents were asked to indicate in an upper triangular matrix which subsystems or databases are combined or will be combined in the nearest future.

There turns out to be a coincidence with the European results in the importance of MRP/MPS in integrating the different systems. But it is worth noting that in Hungary the most computerized subsystems (inventory and accounting) are integrated first, while the European have already reached a satisfactory level in their integration and they do not have immediate need to integrate them. Instead, they focus on quality reporting and sales planning.

Moreover it is quite obvious from the information obtained that in Hungary the MRP philosophy is dominating in developing the manufacturing planning and control. The latest tendencies reported by the West-European managers such as combining some elements of the JIT concept (coproducers instead of suppliers, pull system etc.) with the MRP framework are unknown in Hungary.

Based on the results obtained from the EEC survey, De Meyer distinguished four types of systems. In an internally oriented administrative system mainly the inventory status, accounting and purchasing are computerized and linked first. In the market oriented systems the emphasis is on distribution, order entry and sales planning. The internally oriented technical control systems focus on...
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focus

on process controls, quality reporting and shop-

floor control, while the technical systems link

manufacturing to external groups or systems.

It needs further investigation to prove that—

using this terminology—most systems used by the

Hungarian companies belong to an internally ori-

ented administrative system.

It seems to me that for the time being the

Hungarian companies lack both the necessary

technical means and market incentives to move

either towards technical or market oriented sys-

tems. The ability to integrate computer based

systems in an organization is going to be an

important element in the process of upgrading.

In a related framework Tilanus (1985) analyzed

the reasons for failures and successes in imple-

menting quantitative methods. One of his conclu-

sions was that “User involvement... or, what is

more, user understanding and ease of use are still

more crucial than we have thought”. It means that

the success of implementation of a computer-based

system is highly dependent on the above men-

tioned human elements. An important human ele-

ment is attitude. The attitude to implementation is

the subject of the second part of this paper.

2. Attitudes to implementation

While attitude does not necessarily determine

behaviour it must have influence in the implemen-
tation process. Otway and Fishbein (1977) explain

the relations between beliefs, attitudes, intentions

and behaviours in the following way (see Figure

1). A belief is a probability judgement that links

some object or concept to some attribute. An

attitude is an evaluative judgement that one likes

or dislikes the object, that it is good or bad, that

he feels favourably or unfavourably about it. An

intention is a probability judgement that links the

individual to some specific action, i.e. the indi-

vidual’s belief that he/she will perform some specific

behaviour. Behaviour is an observable action.

It can be seen in Figure 1 that a person has

many beliefs about an object; that is: he/she

associates that object with a number of different

attributes. Figure 1 also shows that a person’s

intention to attain a specific behaviour with re-

spect to an object is viewed as the primary de-

terminant of the behaviour. Attitude determines a

set of intentions only and the behaviour followed

is consistent with this set. One of the problems in

using attitude questionnaires is that an individual’s

responses may not be fully indicative of this indi-

vidual’s behaviour.

Clark et al. (1982) proposed an auditing instru-
mant to assist in the identification of potential

and existing problems with MRP systems. This

auditing instrument consisted of three question-

naires to be used in identifying technical, manage-

ment, and employee attitude problems.

I used the set of statement formulated in the

attitude questionnaire to measure employee atti-
dudes to implementation (for further details on the

attitude scale construction see Edwards, 1957). It

meant that I kept the questionnaire in its original

form as for the wording and order of statements

but instead of using the original six point scale I

changed it to a five point Likert scale (strongly

agree, agree, uncertain, disagree, strongly disagree).

The questionnaire (see Appendix) consisted of

73 statements grouped into five sections:

(1) Support of system/Resistance to change.

(2) Communication between management, the

user and system personnel.

(3) Qualified personnel/User education.

Beliefs about Object X
1
2
3
N

Intentions with respect to Object X
1
2
3
N

Behaviours with respect to Object X

--- influence feedback

Figure 1. Relations between beliefs, attitudes, intentions and behaviours (Otway and Fishbein, 1977)
(4) User participation in system design.
(5) Complexity of design.

Questions in the first section were directed at the degree of user acceptance of the system. The Communication section examined how well personnel (users, managers and system personnel) understood the principles of MRP and were allowed and able to convey their needs to other groups. In the third section questions examined the user's ability to utilize his/her formal education and training in MRP principles. The next section measured the extent of user involvement, responsibility and satisfaction with the system. The last section examined the ease of understanding and use of the system and its information.

Three different groups were formed among the respondents: managers who have a 'macro' view of the system and are using only secondary information derived from day to day 'user' information. The users group has a 'micro' view of the system, they supply and receive day-to-day information in performing their job. The system group includes the system analysts and programmers responsible for designing, implementing, operating and maintaining the computer system.

A person's attitude was measured by asking him/her to indicate the extent of his/her agreement or disagreement with each statement on the above mentioned five point scale.

Basically three types of analysis were carried out. The first type of analysis was directed at the companies and groups and aimed to compare them. It served as some kind of feedback or evaluation of their efforts for implementing the new system. The aim of the second type analysis was to evaluate the questionnaire itself and to determine the dominant questions. Besides these methods discriminant analysis was used to test the validity of the categorization of the respondents.

Likert's method of summated ratings was used to evaluate the respondents' attitude to the new system. This method is based on a classification of statements into two classes; favourable and unfavourable statements where this distinction is made on the aim of the implementation process. This classification was of course unknown for the respondents. In this case it meant an a posteriori classification of the original statement and it was not an easy job to do. To illustrate the categorization: from Section 1 (Support of System) question 4 ("Top management supports the system") is favourable, while question 13 ("The previous system controlled as well as the new systems has thus far") is unfavourable from the point of view of implementing a new system.

For favourable statements, the strongly agree response was given a weight of 4, the agree response a weight of 3, the uncertain response a weight of 2, the disagree response a weight of 1, and the strongly disagree response a weight of 0. For unfavourable statements the scoring system was reversed, with the strongly disagree response being given the 4 weight and the strongly agree response the 0 weight. For each subject we obtain a total score by summating his/her scores for the individual statements.

As for the grouping of the respondents: the attitude questionnaires were not sent but were directly distributed by the representatives of the companies among those who were supposed to
itself and to test the respondents. Besides these, the new system was used to the new classification of the and un-differentiated respondents. The sample consisted of the five selected companies. 255 questionnaires were distributed among them, of which 174 were sent back (68.2% response rate). The distribution of attitude questionnaires in the sample is shown in Table 4.

Because our interest was to compare the attitudes of the companies and groups the attitude scores obtained were expressed as T scores.

\[
T_c = 50 + 10 \times \frac{(X_c - X_q)}{S},
\]

where

- \(T_c\) = T score of category C, where C represents both the groups and companies;
- \(X_c\) = the mean score of category C;
- \(X_q\) = the mean score of the questionnaires in the sample;
- \(S\) = the standard deviation of the scores in the sample.

\(T\) has a mean of 50 and a standard deviation of 10 and it can be interpreted as follows. If the scores are higher than 50 it can be interpreted as scores that are more favourable than the average for the sample and scores that are lower than the mean can be interpreted as scores that are less favourable than the average. Table 5 shows the \(T\) scores for the companies and the groups.

From Table 5 we can see that the Manager group and Companies III and IV have more favourable attitude to implementation of the new system than the average, while the users and Companies I, V and II are below the average.

A rational explanation may be based on the following. In Hungary the managers and the system personnel are usually more educated and more motivated than the users for whom a new system, besides the indirect and long term advantages, means direct and immediate problems to solve. They have to learn new screen and printer formats, new code systems and what is even more they have to give up working with the good old methods. The mismanagement of the implementation project may contribute to these negative attitudes.

In the case of managers it is necessary to take into account that they are not affected so directly and to such a great extent by the negative effects of the new system than the users. Furthermore their positive attitude can be explained by the changes taken place in the Hungarian economy. Under the circumstances of the classical planned economy the survival of a company does not at all or only to a small extent depend on the internal, operational efficiency of the company. Successes and failures of companies are determined mainly by external political and economic factors. Due to the known Hungarian events this situation has changed and more emphasis was given to the operational efficiency. In this situation the managers have more interest to implement sophisticated production planning and control systems because the results obtained by their implementation cannot be reached or is becoming more and more difficult to reach by other means.

The System Personnel can be considered as a neutral group: the creation of the new system is their job, they are 'only' doing their job.

The more detailed evaluation of the company attitudes is out of the scope of this paper because it is interesting first of all for the companies themselves.

The analysis of the questionnaire is based on the reliability or internal consistency of the statements included in the questionnaire and is rooted in the classical test theory (see Dijkstra (1989) for a concise overview, Bohrnstedt (1969), Lord and Novick (1968), and Cronbach (1951) for the technical details).

The aim of this analysis was to reduce the number of statements through computing 'Cronbachs alpha' as the measure of internal consistency. Alpha indicates the extent to which the requirements of the classical tests theory are met. The theory is based on the idea that a set of statements can be regarded as repeated measurements of an underlying latent attribute. In this

<table>
<thead>
<tr>
<th>Company/Group</th>
<th>T score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company III</td>
<td>55.68</td>
</tr>
<tr>
<td>Company IV</td>
<td>51.87</td>
</tr>
<tr>
<td>Company I</td>
<td>49.57</td>
</tr>
<tr>
<td>Company V</td>
<td>47.89</td>
</tr>
<tr>
<td>Company II</td>
<td>45.95</td>
</tr>
<tr>
<td>Managers</td>
<td>52.68</td>
</tr>
<tr>
<td>System Personnel</td>
<td>49.89</td>
</tr>
<tr>
<td>Users</td>
<td>47.39</td>
</tr>
</tbody>
</table>
case at the value of 0.90 of the alpha 21 statements remained. These were the following:

- Support of system: 7, 8, 14.
- Communication: 2, 7, 11, 13, 15.
- User education: 3, 4, 9.
- User participation: 2, 3, 8, 10.
- Complexity of design: 2, 4, 6, 7, 10, 12.

Taking into account their semantic meaning, this 21 item instrument represents a general evaluation dimension. The remaining 52 statements contain specific variation but cannot be described by general factors.

As for the future use of this questionnaire it was important to know the validity of the categories used. Are these categories (groups and companies) really classifying the respondents? In order to answer this question and to identify the differences between the group and company profiles multiple-discriminant analysis was used (see Dillon and Goldstein, 1984). In both cases the discriminating functions classified nearly 90% of the respondents correctly that is both categorization are valid.

3. Summary

I think that the results of this survey can be used and evaluated at different levels.

(i) On a more general ‘macro’ level it gives information on the place of the Hungarian companies in the world and relates their specifics to the others.

(ii) On a ‘micro’ level it helps the companies participating in the detailed survey to evaluate the acceptance of their project from the point of view of their employees and in this sense the company can easy the difficult task of implementation.

(iii) This survey helped in evaluating the auditing instrument based on the attitude questionnaire and proposed by Clark et al. (1982) in two ways. Firstly, it contributed to its development by determining the dominant questions, secondly using it the results can be compared and may serve for future comparisons.

(iv) As for the relationships between the level of development and the implementation process roughly speaking we can say that that the question ‘what to do?’ does not influence the question of ‘how to do’ meaning that the successful management of a project seems to be independent of the broader environment.

(v) It seems from the results that in Hungary due to the lack of incentives (especially the market forces) not enough emphasis is put on the employee attitudes to system implementation and therefore even the best technical solutions cannot reach their full capacity.

Appendix

Instructions for the employee attitude questionnaire

The attitude questionnaire (Table A) is to be administered to management, users, and system personnel involved with the computer-based integrated production inventory system. The term ‘management’ refers to those employees having a ‘macro’ view of the system, i.e., who use only secondary information derived from day-to-day ‘user’ information. The user group consists of employees involved with the computer system on a ‘micro’ level, i.e., who supply and receive day-to-day information in performing their job. The ‘system’ group includes the system analysts and programmers responsible for designing, implementing, operating, and maintaining the computer system.

The attitude questionnaire consists of the following sections:

1. Support of system/Resistance to change.
2. Communication between management, the user, and data processing.
3. Qualified personnel/User education.
4. User participation in system design.
5. Complexity of design.

Respondents should indicate in the blank provided whether they are included in the management, user, or system group. Next, read each statement carefully and circle one number only, depending upon how you react to each individual statement. The appropriate number to circle is as follows:

1–Strongly agree (SA).
2–Agree.
3–Indifferent.
4–Disagree.
5–Strongly disagree (SD).
X–Don’t understand the question.
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Table A
Group: Human problems

<table>
<thead>
<tr>
<th>Support of system / Resistance to change</th>
<th>SA</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The system changes the organization’s power structure</td>
<td>1  2  3  4  5  X</td>
<td></td>
</tr>
<tr>
<td>2. The system changes social relations within the work environment</td>
<td>1  2  3  4  5  X</td>
<td></td>
</tr>
<tr>
<td>3. The system requires unlearning old work methods and acquiring new work methods</td>
<td>1  2  3  4  5  X</td>
<td></td>
</tr>
<tr>
<td>4. Top management supports the system</td>
<td>1  2  3  4  5  X</td>
<td></td>
</tr>
<tr>
<td>5. The system requires me to make decisions on a formalized basis with little individual discretion</td>
<td>1  2  3  4  5  X</td>
<td></td>
</tr>
<tr>
<td>6. The system aids others more than myself</td>
<td>1  2  3  4  5  X</td>
<td></td>
</tr>
<tr>
<td>7. The system is more useful than the previous system</td>
<td>1  2  3  4  5  X</td>
<td></td>
</tr>
<tr>
<td>8. The system will work in our organization</td>
<td>1  2  3  4  5  X</td>
<td></td>
</tr>
<tr>
<td>9. The system requires new personal relationships that are uncomfortable for me</td>
<td>1  2  3  4  5  X</td>
<td></td>
</tr>
<tr>
<td>10. The goals of the systems aid me in the achievement of my personal goals</td>
<td>1  2  3  4  5  X</td>
<td></td>
</tr>
<tr>
<td>11. I need the information the system provides</td>
<td>1  2  3  4  5  X</td>
<td></td>
</tr>
<tr>
<td>12. The computer was introduced to replace people</td>
<td>1  2  3  4  5  X</td>
<td></td>
</tr>
<tr>
<td>13. The previous system controlled as well as the new system has thus far</td>
<td>1  2  3  4  5  X</td>
<td></td>
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<tr>
<td>14. The system enables me to perform my job better</td>
<td>1  2  3  4  5  X</td>
<td></td>
</tr>
<tr>
<td>15. The system has produced stress between certain areas of the organization</td>
<td>1  2  3  4  5  X</td>
<td></td>
</tr>
</tbody>
</table>

Communication between management, the user, and data processing

| 1. The users are capable of communicating their information needs to the system design team | 1  2  3  4  5  X |
| 2. The system design team understands the users’ functions | 1  2  3  4  5  X |
| 3. Data processing has a higher position in the organization than the users have | 1  2  3  4  5  X |
| 4. Data processing lacks a technical understanding of the manufacturing process | 1  2  3  4  5  X |
| 5. There is a gap in the levels of formal education between users and data processing | 1  2  3  4  5  X |
| 6. The users were able to explain their information needs to the systems analyst | 1  2  3  4  5  X |
| 7. Reports are tailored to the users needs | 1  2  3  4  5  X |
| 8. The system users have little computer-experience | 1  2  3  4  5  X |
| 9. The personnel on the design team have a low turnover rate | 1  2  3  4  5  X |
| 10. Too many people were on the design team | 1  2  3  4  5  X |
| 11. The users on the design team were knowledgeable in the manufacturing operations of the organization | 1  2  3  4  5  X |
| 12. The users of the system feel free to criticize the system’s performance | 1  2  3  4  5  X |
| 13. There is conflict between user values, management values, and data processing values | 1  2  3  4  5  X |
| 14. The users’ ideas are seriously evaluated to their feasibility | 1  2  3  4  5  X |
| 15. Personal conflict exists between users, data processing, and management | 1  2  3  4  5  X |
Table A (continued)

<table>
<thead>
<tr>
<th>Qualified personnel/User education</th>
<th>SA</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The system users make decisions based on the reported information</td>
<td>1 2 3 4 5 X</td>
<td></td>
</tr>
<tr>
<td>2. The system users understand the system concepts and operating details</td>
<td>1 2 3 4 5 X</td>
<td></td>
</tr>
<tr>
<td>3. The system design understand the users' information needs</td>
<td>1 2 3 4 5 X</td>
<td></td>
</tr>
<tr>
<td>4. The system users have confidence in the system's design</td>
<td>1 2 3 4 5 X</td>
<td></td>
</tr>
<tr>
<td>5. The system designers possess computer expertise and creative ability</td>
<td>1 2 3 4 5 X</td>
<td></td>
</tr>
<tr>
<td>6. I understand my duties with respect to the system</td>
<td>1 2 3 4 5 X</td>
<td></td>
</tr>
<tr>
<td>7. I understand other users' duties</td>
<td>1 2 3 4 5 X</td>
<td></td>
</tr>
<tr>
<td>8. Management does not understand the requirements of my system duties</td>
<td>1 2 3 4 5 X</td>
<td></td>
</tr>
<tr>
<td>9. Some of the system reports that I receive are difficult to understand</td>
<td>1 2 3 4 5 X</td>
<td></td>
</tr>
<tr>
<td>10. I have above-average knowledge in computerized information systems</td>
<td>1 2 3 4 5 X</td>
<td></td>
</tr>
<tr>
<td>11. The system generates more information than I can use</td>
<td>1 2 3 4 5 X</td>
<td></td>
</tr>
<tr>
<td>12. Most of my knowledge about our computer system came from on-the-job experience rather than from formalized training session</td>
<td>1 2 3 4 5 X</td>
<td></td>
</tr>
<tr>
<td>13. The system requires much more of my time than it does the other users</td>
<td>1 2 3 4 5 X</td>
<td></td>
</tr>
<tr>
<td>14. There is a continuous educational program to educate users with respect to the system and changes made to it</td>
<td>1 2 3 4 5 X</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>User participation in system design</th>
<th>SA</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I helped in the design of the system</td>
<td>1 2 3 4 5 X</td>
<td></td>
</tr>
<tr>
<td>2. I am satisfied with the system</td>
<td>1 2 3 4 5 X</td>
<td></td>
</tr>
<tr>
<td>3. The reports of the system are in a form that facilitates their usage</td>
<td>1 2 3 4 5 X</td>
<td></td>
</tr>
<tr>
<td>4. Participation in the system design placed many hardships on my department</td>
<td>1 2 3 4 5 X</td>
<td></td>
</tr>
<tr>
<td>5. The users in my department do not work well with the system design team</td>
<td>1 2 3 4 5 X</td>
<td></td>
</tr>
<tr>
<td>6. The users continually review the performance and report needs of the system</td>
<td>1 2 3 4 5 X</td>
<td></td>
</tr>
<tr>
<td>7. The users had several options to choose from during the design stage</td>
<td>1 2 3 4 5 X</td>
<td></td>
</tr>
<tr>
<td>8. The users' information needs have been completely identified</td>
<td>1 2 3 4 5 X</td>
<td></td>
</tr>
<tr>
<td>9. The major user design task involved the report formats</td>
<td>1 2 3 4 5 X</td>
<td></td>
</tr>
<tr>
<td>10. Positive results can be attributed to my efforts in the system design</td>
<td>1 2 3 4 5 X</td>
<td></td>
</tr>
<tr>
<td>11. The bulk of the design effort was the responsibility of the information systems specialist</td>
<td>1 2 3 4 5 X</td>
<td></td>
</tr>
<tr>
<td>12. I had little knowledge of the theory of CBPIS when the system's design took place</td>
<td>1 2 3 4 5 X</td>
<td></td>
</tr>
<tr>
<td>13. The users designed the data entry procedures for reporting system transactions</td>
<td>1 2 3 4 5 X</td>
<td></td>
</tr>
</tbody>
</table>
Acknowledgement

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