

INFLUENCE FACTORS AFFECTING THE PERFORMANCE OF ACCOUNTING INFORMATION SYSTEMS

Soegiharto

This paper presents results of a survey questionnaire used to investigate the direct relationship between influence factors and AIS performance. This study focused on user involvement, user capability, management support, organization size, and formalization of IS development as influence factors and on AIS satisfaction and user system usage as surrogates of AIS performance.

Forty-five companies were involved in this study. The research questionnaire is to be completed by users of the AIS in those companies and will assist in measuring users' perception in relation to both the influence factor and the AIS performance. The questionnaires were spread over all levels of the company's formal hierarchy, which include such departments as general accounting, finance, tax, and cost accounting.

The main findings of this study indicated that the more the users of AIS involve in the design, development and implementation of the system the more they use the system. The others interesting findings suggested that the capability of AIS personnel has indirect effect on AIS performance and formalization of information system development is higher in an organization which have user training and education program, steering committee, and independent location of IS department.

Keywords: AIS satisfaction; formalization of IS development; management support; organization size; system usage; user capability; user involvement

Introduction

Research into information system (IS) performance has tried to identify factors that influence a system's success. Results have highlighted direct effects of factors such as top management support, technical capability of IS personnel, user involvement in system development, user training and education, IS steering committees, location of IS department, formalization of system development and organizational size on the successful implementation and performance of IS. Specifically, this research attempts to investigate the direct relationship between influence factors and performance of accounting information systems (AIS).

In this study AIS performance is measured based on two surrogates: user satisfaction and system usage. The reason to investigate the performance of AIS is this system is often the most widely used and the largest of the information subsystem in a business organization. In some organizations, AIS is the only formally designated information system and is thus, in effect, the management information system. The questionnaires used in this research is to be completed by users of the AIS.

Previous Research

User Information Satisfaction

Several information system researchers have suggested user satisfaction as a success measure for their empirical information system researches (Ein-Dor and Segev 1978; Hamilton and Chervany 1981). These researchers have found user satisfaction as especially appropriate when a specific information system was involved. The key issue is whose satisfac-

tion should be measured. User satisfaction is also recommended as an appropriate success measure in experimental information research (Jarvenpaa et al. 1985) and for researching the effectiveness of group decision support systems (Chervany and Sanders 1986).

System Usage

The use of information system reports is one of the most frequently reported measures of the success of an information system. Several researchers (Lucas 1978; Schultz and Slevin 1975; Ein-Dor and Segev 1978; Ives and Olson 1984; Hamilton and Chervany 1981) have proposed information system use as an MIS success measure in conceptual MIS articles. Ein-Dor and Segev (1978) claimed that different measures of computer success are mutually interdependent and so they chose system use as the primary criterion variable for their information system research framework. After reviewing empirical studies DeLone and McLean (1992) found researchers employ system use as at least one of their measures of success. Of all the measures identified, the system use variable is probably the most objective and the easiest to quantify, at least conceptually. Usage, either actual or perceived, is only pertinent when such use is voluntary. When the use of an information system is required, the system usage measures become less useful and successful interaction by management with the information system can be measured in terms of user satisfaction.

User Involvement in IS Development

User involvement in systems development is predicted to improve system quality by (1) providing a more accurate and complete assessment of user informa-

tion requirements (McFarlan and McKenney 1983; Robey 1979), (2) providing expertise about the organization the system is to support, expertise usually unavailable within the information systems group (Lucas 1978; Robey 1979), (3) avoiding development of unacceptable or unimportant features (Robey 1979), (4) improving user understanding of the system (Lucas 1978). Involvement may lead to increased user acceptance by (1) developing realistic expectations about system capabilities (Gibson and Nolan 1974), (2) providing an arena for bargaining and conflict resolution about design issues (Maish 1979), (3) leading to system ownership by users (Robey 1979), (4) decreasing user resistance to change (Lucas 1978), and (5) committing users to the system (Lucas 1978).

Capability of IS Personnel

Anderson (1985) proposed that the potential contribution of users is higher during the definition and implementation phases of system development. The more users understand the technology, the task and decisions involved, and the social-political environment within which the system will be used, the more likely they can contribute to system development. Average education or experience levels of IS group members can be used to measure the capability of information system personnel (Ives et al. 1983). Technical capability of IS personnel has a major influence on the information requirements analysis and the design of IS. For example, competent system analysts have a positive effect on the information requirement assessments (Huff and Munro 1985; McFarlan and McKenney 1983). Bruwer (1984) also suggested that the performance of IS is related to the technical quality or

the design quality of the system, which is the responsibility of system personnel.

Organization Size

Ein-Dor and Segev (1978) found that organizational size had special importance because, as an uncontrollable variable, it had major impact on the requirement necessary for integration of different professional units within an organization, degree of formalization of organizational systems, resource availability, and lead time for planning and implementation of CBIS projects. Although Raymond (1985) did not find any significant association between organizational size (i.e., number of employees) and end-user satisfaction or systems utilization, there seems to be some association between organizational context variables and CBIS environment. Franz and Robey (1986) found inverse relationships between organization size and age and the usefulness of computer-based systems. Lehman (1986), however, has found a relationship between organizational size and the use of sophisticated computer-based tools. Raymond (1990) also found that size was positively related to the organizational measures of user satisfaction and on-line usage.

Top Management Support

Top management support towards CBIS have received considerable research attention (Ginzberg 1981). Management concepts being advocated include viewing information systems as a business within a business (McFarlan and McKenney 1983), managing the information resource by committee (Nolan 1979), developing strategic plans for the information systems function (King and Rodriguez 1978), understanding the contingency approach to management and analyzing the firm's port-

folio of present and potential project (McFarlan and McKenney 1983). Collectively, top management is responsible for providing general guidance for the information system activity. Thus, the extent of support given by top management to the organizational information system could become a very important factor in determining the success of all information system-related activities (Lucas 1981; Raghunathan and Raghunathan 1988).

Formalization of IS Development

Study by Neal and Rander (1973) indicated empirically the positive relationship between operations research/management science group success and the formalization and proceduralization of operations research/management science. Other studies also demonstrated that the formalization of system development influence the successful implementation of IS (Lee and Kim 1992; Thayer et al. 1981). An organization tends to formalize IS development because it is needed to enhance communication and coordination between systems developers and users, or among developers of specific systems. In a survey of 294 individuals, Thayer et al. (1981) demonstrated that computer professionals believe that "using or enforcing (existing) standard, procedures, and documentation" will solve problems associated with software engineering.

User Training and Education Program

Brady (1967) suggested that lack of education is a major reason for the lack of MIS utilization. A study of the key information system issues for the 1980's ranked "user education" as the sixth most important issue (Dickson et al. 1980). Implicitly stated in their findings is that IS-related

education/training effects the acceptance and usage of IS technologies throughout the organization. Nelson and Cheney (1987) empirically evaluated a conceptual model of how training can impact the acceptance of information systems within the organization. The results indicated that a positive relationship exists between the computer-related training and individual receives and his/her computer-related ability, and a positive relationship exists between the computer-related ability of an end user and his/her acceptance of information systems products and technologies.

IS Steering Committee

A study by Choe (1996) provided evidence as to the influence of the IS steering committee on AIS performance. He found system usage as surrogate of AIS performance was higher in organizations that have no steering committees and found user AIS satisfaction, as another surrogate of AIS performance, was not affected by the existence or nonexistence of IS steering committees. Doll (1985) found that organizations with steering committees tended to have more formal IS planning processes and firmer commitments for long-term funding for IS. Drury (1985) found that IS steering committees were effective in the context of such managerial issues as directing top management attention to IS, getting user involvement, and increasing IS awareness of user needs.

Location of IS Department

Gibson and Nolan (1974) proposed that in the initiation stage it makes economic sense to locate the EDP unit in the department where it is first applied-very frequently, in accounting-and to hold that department responsible for a smooth in-

roduction and a sound control of costs and benefits. However, the department where the computer will first be used may not be the best location for the EDP facility later on. Ein-Dor and Segev (1982), after analyzing data and case studies, also proposed that the most common practice seems to have been to establish information units at the area needing the initial applications. As a result, there is a wide distribution of initial locations. Choe (1996) empirically investigated the difference in AIS performance between companies which located their IS department independently or within another department. He found no difference in AIS performance between these companies.

Research Method

Instrument Development

Questionnaire prepared for this study (reproduced in Appendix 1) were constructed to measure the perceptions of users of the AIS. In this study, user AIS satisfaction and system use are considered surrogate measures for the performance of AIS. An underlying reasoning of measuring user AIS satisfaction and system use as surrogates is that the direct relationships among information system quality, user information system satisfaction, use of IS, and decisional or organizational effectiveness are assumed to exist (Bruwer 1984; Conarth and Mignen 1990; Doll and Torkzadeh 1988; Ives et al. 1983).

Goodhue (1988) has argued that user information system satisfaction can be divided into two constructs. One is information system satisfaction brought about by the correspondence between the information system’s intrinsic benefits and the needs of the user, and the other is information system satisfactoriness resulting from

the correspondence between job requirements and system functionality. This study utilized a measure of information system satisfactoriness. The measure of user AIS satisfaction was based on a set of ten questionnaire items that were adopted from study of Choe (1996). The degree of system usage may not be an appropriate performance measure if system use is mandatory (Lucas 1981). In this perspective, system use was measured by consideration of both the frequency and the willingness of use. This instrument was also adopted from study of Choe (1996).

Section I surveyed the AIS performance. The first question in this section asked what department the user is in. The answer of users indicated that they belong to accounting and/or finance and/or administration department. Question 2 asked the name of AIS that are used by the users in their department. Name of the systems and the number of companies that use them are presented in Table 1.

Section II surveyed factors that influence AIS performance. These factors include user involvement in the development of specific AIS, user training and education, user technical capability and education background, the existence or

Table 1. AIS and the Number of Companies Used the Systems

AIS	Frequency
1. Quickbooks.....	2
2. Oracle Financial.....	2
3. BPCS.....	3
4. Solution 6.....	3
5. Pronto.....	3
6. Sun Account.....	3
7. MAC.....	3
8. In house development system....	3
9. Others.....	20

nonexistence of an IS steering committee, location of information systems department, and organization size.

To measure user involvement, users of AIS were asked to scale their participation and influence in the AIS development. To measure user training and education, users were asked whether their company or department have a training and education program. If the answer is "yes", then they were asked to scale the benefit they gained from that program. Twenty seven users indicated that their departments or companies had training and education program and the other 18 indicated that their departments or companies did not have such programs.

Capability of information system personnel can be measured using average education/experience levels of IS group members (Ives et al. 1983). In this study, information system group members were classified into one of five categories according to level of experience. These categories were given the weights 1, 3, 5, 7, and 9, respectively, and the number of personnel belonging to each category was multiplied by the weight for the category. By summing up the scores and dividing by the total number of information system personnel, the average level of experience or capability of AIS personnel was obtained. In this study, users experiences in current AIS and experiences in other AIS that they used to operate were obtained to measure their overall experiences in AIS.

For organization size, it can be measured based on the sales volume or premium income and the number of employees (Ein-Dor and Segev 1982; Harris and Katz 1991; Raymond 1990). Number of employees is the most common size criterion used by researchers (DeLone 1988; Raymond 1985). Therefore, in this study, the organization size was measured by the number of employees.

The information about the existence or nonexistence of an IS steering committee was obtained by asking whether one company does have or does not have the committee. The information about the location of IS department was obtained by asking whether the IS department in one company is independent or located within another department.

Section III surveyed top management support for information systems development and operation and procedures employed for the formalization of systems development. The instrument used to measure these variables was adopted from the questionnaire developed by Choe (1996). Two of five items measure the attitudes of top management and the remaining three measures the extent of top management involvement in the IS planning and control. For the formalization of system development the instrument consists of five items that measure the current status of the project control procedure.

Subject Selection

Research questionnaires were sent to 351 companies that spread around Australia. These questionnaires is to be completed by users of the AIS and will assist in measuring users' perception in relation to both the influence factors and the AIS. The questionnaires were spread over all levels of the company's formal hierarchy. This includes such departments as general accounting, finance, tax, and cost accounting. Companies' names, addresses as well as the names of their manager of IS (or equivalent) were obtained from either ASX Data Disk or Australia Business Who's Who Disk.

A total of 45 questionnaires were received. This represents a response rate of 12.82 percent of the 351 firms in the sample. This response is relatively low

Table 2. Respondent Classification

Type of Business	Frequency
Manufacturing.....	15
Mining and Exploration.....	10
Services.....	7
Wholesale and Retail Trade.....	4
Transportation, Communication and Utilities.....	4
Health Service/Hospitals.....	3
Other.....	2

Number of Employees	Frequency
Less than 100.....	16
100 to 499.....	16
500 to 999.....	7
1000 to 4,999.....	6
5,000 or more.....	1

compared to the information system survey. The industry group and the firm size categories of the companies that returned the completed questionnaires are presented in Table 2.

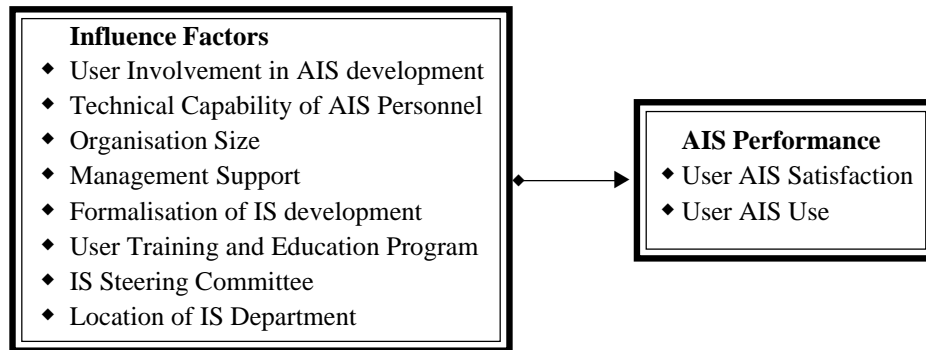
Dependent and Independent Variables

In this study, two dependent variables, user information satisfaction and system usage were used as surrogates in measuring the success of AIS. User involvement in IS development, user training and education, top management support, steering committees, formalization of IS development, location of IS department, technical capability of IS personnel, and organization size, which have been investigated critically in previous implementation factor researches (e.g.. Cheney et al. 1986; Doll 1985; Franz and Robey 1986) were included as independent variables (influence factors).

Hypotheses Development

The objectives of this study are to examine direct relationships between influence factors and performance of accounting information systems (AIS). To explain the relationship between the variables in this study more clearly and explicitly, the research model is depicted graphically in Figure 1.

Many researchers have studied user involvement. They believed that it affects such key criteria as systems quality, user satisfaction, and system use (Ives and Olson 1984). Bruwer (1984) and Hirschheim (1985) believed that user involvement in the system development process have a positive effect on satisfaction with CBIS. The MIS literature shows almost general agreement that the success of information systems can be improved by involving user in the development of those systems. To study the relationship between user involvement in AIS develop-

Figure 1. **Research Model**

ment process and AIS performance, hypothesis 1.1 can be stated as follows:

$H_{1.1}$: *There is positive relationship between user involvement in AIS development process and the performance of AIS.*

Many researchers assumed that the level of an end user's computer literacy directly affects satisfaction with a CBIS (Bruwer 1984; Hirschheim 1985; Nelson and Cheney 1987). Choe (1996) found positive relationship between the capability of AIS personnel and system usage. In another study, Montazemi (1988) found that an end user's level of computer literacy influences end-user satisfaction and appreciation of CBIS. This observation substantiates the perception of Hirschheim (1985), Nelson and Cheney (1987). Huff and Munro (1985) also found that technical capability of IS personnel has an influence on the design quality and the performance of IS. Based on these findings, hypothesis 1.2 is stated as follows:

$H_{1.2}$: *There is positive relationship between technical capability of AIS personnel and the performance of AIS.*

Many researchers have proposed that organization size is positively related to the success of IS, since the funds or the

resource support is more sufficient in larger organization (Ein-Dor and Segev 1978; Raymond 1990). If resources are insufficient, system designers may not adequately follow normal development procedures, thus increasing the risk of system failure. Based on this argument, hypothesis 1.3 is stated as follows:

$H_{1.3}$: *There is positive relationship between organization size and the performance of AIS.*

Cerullo (1980), DeLone (1988), and Doll (1985) have suggested and empirically tested that top management support has a positive effect on the performance of IS through diverse activities. Top management is responsible for providing general guidance for the information system activity. The extent of support given by top management to the organizational information system could become a very important factor in determining the success of all information system-related activities (Lucas 1978; Raghunathan and Raghunathan 1988). To study the relationship between management support and AIS performance, hypothesis 1.4 can be stated as follows:

$H_{1.4}$: *There is positive relationship between top management support and the performance of AIS.*

Study by Neal and Rander (1973) indicated empirically the positive relationship between operations research/management science group success and the formalization and proceduralization of operation research/management science. In information system issue, the relationship between the formalization of system development and IS success was proposed and empirically tested by Lee and Kim (1992) and Thayer et al. (1981). Both suggested that the formalization of system development influence the successful implementation of IS. Based on these arguments, hypothesis 1.5 is stated as follows:

H_{1.5}: There is positive relationship between formalization of system development and the performance of AIS.

With training and education users can acquire the ability to identify their information requirements and the advantages and the limitations of IS, and this ability can lead to increased performance (Montazemi 1988). Bronsema and Keen (1983) discussed implementation education as a vehicle for change and suggested that the success of any information system implementation effort increase substantially if there is a strong commitment to education. Cronnan and Douglas (1990) explored the effectiveness of end-user computing following a training program and found that it increased productivity and resulted in a high degree of satisfaction with the program. Other researchers have proposed positive relationships among user training, user attitude, and success of IS (Cheney et al. 1986; Sanders and Courtney 1985; Yaverbaum and Nosek 1992; Nelson and Cheney 1987). Based on the above

argument and findings, hypothesis 2.1 is stated as follows:

H_{2.1}: The performance of AIS is greater in an organization where a user training and education program is introduced than that in an organization where a user training and education program is not introduced.

Steering committees have an influence on the performance of IS through such essential functions as setting the direction of IS activities, structuring the IS department and staffing of IS personnel. (Nolan 1979; Olson and Ives 1981). Emdor and Segev (1978) and Drury (1985) also suggested that key functions of steering committees have an effect on the performance of IS. Based on this argument, hypothesis 2.2 is stated as follows:

H_{2.2}: The performance of AIS is greater in an organization where an IS steering committee is introduced than that in an organization where an IS steering committee is not introduced

Several studies have proposed that the location of the IS department or IS manager is positively related to IS success (Cheney et al. 1986; Franz and Robey 1986). Raymond (1985) also empirically found a positive relation between the location of IS department and the success of IS. To study the effect of IS department location on AIS performance, hypothesis 2.3 can be stated as follows:

H_{2.3}: The AIS performance is greater in an organization where the IS department is a separate, independent identity than that in an organization where the IS department is located within another department.

Data Analysis And Results

Assessment of Reliability and Validity

The reliability of a measure refers to its stability over a variety of condition. In this study the reliability of the responses to all instruments was assessed by means of the Cronbach alpha reliability coefficient. Table 3 presents a summary of the reliabil-

ity results for each of the instruments used. The reliability of the overall instruments ranged from .76 to .91; these figures are comparable to those reported by Choe (1996) for the same instruments (ranged from .67 to .91). All instruments are considered as satisfactory for exploratory research since they meet the level of 0.7 (Nunnally 1978).

Table 3. Cronbach Reliability Coefficient

Variable	Before Deletion		After Deletion	
	Number of Items	Alpha Coefficient	Numbers of Items	Alpha Coefficient
User AIS Satisfaction	10	.9090	8*	.9135
User System Usage	2	.7621		
User Involvement in AIS Development	2	.8741		
Top Management Support	5	.8645	4**	.8736
Formalization of IS Development	5	.9112		

* = Question 4 and 12 were deleted; ** = Question 35 was deleted

Table 4. Principal Axis Factoring Analysis using Varimax Rotation

Question	Factor				
	(1) User AIS Satisfaction	(2) Formalization of IS Development	(3) Top Management Support	(4) User Involvement	(5) User System Usage
Q9	.91436				
Q8	.83217				
Q3	.81267				
Q10	.76605				
Q5	.75941				
Q6	.73595				
Q13	.66126				
Q11	.51776				
Q37		.82618			
Q33		.81457			
Q36		.81338			
Q34		.73946			
Q35		.66853			

Continued from Table 4.

Question	Factor				
	(1) User AIS Satisfaction	(2) Formalization of IS Development	(3) Top Management Support	(4) User Involvement	(5) User System Usage
Q28			.87404		
Q30			.78818		
Q31			.74844		
Q32			.72813		
Q16				.86672	
Q17				.83502	
Q15					.84073
Q14					.57303

Table 5. Summary Statistics of Research Variables (n = 45)

Variables	Mean	Standard Deviation	Minimum	Maximum
User AIS Satisfaction	4.6538	.9443	2.25	6.63
User System Usage	3.9240	.5345	2.50	4.47
User Involvement in IS Development	4.7470	1.5176	1.00	7.00
Capability of AIS personnel	5.5060	2.2047	1.00	9.00
Management Support	2.4432	1.0051	0.50	3.90
Formalization of IS Development	3.3429	1.7269	1.00	7.00
Organization Size*	389.44	496.30	45	2,000

* n = 44, one outlier was deleted

An instrument must be valid in order to provide an accurate representation of an abstract concept. Generally, any instrument is valid if it does what it is intended to do. In this study, to measure five different constructs, 21 questionnaire items were used. The number of factors to extract can be given, based on the number of constructs to measure (Kim and Muller 1981). In this study the data was examined using PAF analysis as the extraction technique and Varimax as a method of rotation. Without specifying the number of factors, five factors with eigen values greater than one

emerged. The result of the analysis is presented in Table 4.

Using the 0.40 criterion for a significant item loading on a factor, the result indicated that all items within each index are represented by a single factor, and the items of each factor do not confound with the items in other factors. A single scale for the research variable was constructed by averaging a respondent's scores over the items measuring each variable.

The values of mean and standard deviation for the research variables were calculated and are summarized in Table 5.

Table 6. Correlation Coefficient between Influence Factors and AIS Performance (n = 45)

AIS Performance	Influence Factors				
	User Involvement	Capability of AIS Personnel	Organization Size	Management Support	Formalization of IS Development
User Satisfaction**	r = .0992 p = .269	r = -.1455 p = .179	r = -.3346* p = .016	r = .1045 p = .255	r = -.0853 p = .296
System Usage**	r = .3655 p = .009	r = -.1564 p = .166	r = -.4230* p = .003	r = .0034 p = .492	r = -.2735 p = .040

*n=44, one outlier was deleted

**= correlation coefficient between these two variables is .4023 and p = .004

The Relationships between Influence Factors and AIS Performance

To assess the direct relationships between influence factors and AIS performance the data were analyzed using Pearson Product Moment correlation analysis. The correlation matrix for the five influence factors and the surrogates of AIS performance: user satisfaction and system usage, is presented in Table 6.

Hypothesis 1

It can be seen from Table 6 that there are inconsistent correlations between the influence factors and the AIS performance. The only one significant positive correlation is between user involvement and system usage. It means the effect of user involvement in the system development process on system usage is substantial, thereby confirming the observation made by Hirschheim (1985). This result, however, only partially supports Choe's study (1996), which found significant positive correlation between user involvement and

system usage ($r = .368, p < .01$) and between user involvement and user satisfaction ($r = .354, p < .01$). The positive effects of end-users involvement can be attributed to a number of factors such as a better fit of the information systems with the requirements, ease of operating the systems due to learning experience during the design phase, and a feeling of ownership (Hirschheim 1985).

This study found no relationship between user involvement and user satisfaction. The available empirical literature in this relationship painted a confused picture. A number of studies reported a positive relationship (King and Rodriquez 1978; Robey and Zeller 1978) while the others reported negative relationship. In this study, the result agreed with the study by Olson and Ives's (1981), and Tait and Vessey's (1988), which found no correlation between user involvement and user satisfaction. The presence of these conflicting results makes it difficult to say anything meaningful about the relationship between these variables.

Three other significant correlations but negatively correlated are between user satisfaction and organization size, between system usage and organization size and between system usage and formalization of IS development. These correlations indicate that the smaller the size of an organization the higher the AIS performance and the higher the degree of formalization of IS development the lower the usage of the AIS. These findings disagreed with study of Choe (1996). The possible explanation why the smaller the size of organizations the higher their level of AIS performance is that they may have uncomplicated AIS which can be operated easily to fulfill the needs of the organizations. This result disagreed with the study by Gremillion (1984) and Raymond (1985) which could not find a direct link between size and user satisfaction or system usage and opposed the study by Yap (1990) which empirically suggested a positive relationship between IS use and organization size measured by annual turnover. The result of this study, however, in line with Franz and Robey's study (1986) that found inverse relationships between organization size and age and the usefulness of computer-based systems.

The other correlations between influence factors and AIS performance are insignificant ($p > 0.1$). Therefore, it can be deduced that there are no relationships between (1) user involvement and user satisfaction, (2) capability of IS personnel and AIS performance, (3) management support and AIS performance, and (4) formalization of IS development and user satisfaction.

Based on the above findings it can be concluded that hypothesis $H_{1,1}$ which relates user involvement to the performance of AIS is partially supported. $H_{1,2}$ which relates the capability of AIS personnel to

the performance of AIS and $H_{1,4}$ which relates management support to the performance of AIS are not advocated by the results. Hypotheses $H_{1,3}$ and $H_{1,5}$ which assume the positive relationships between organizational size and AIS performance and between formalization of IS development and AIS performance are contrary to the findings.

Other Findings from Correlation Analysis

The correlation between the surrogates of AIS performance, user satisfaction and system usage, is significantly positive ($r = .4023$ and $p < .01$). It can be interpreted that the users are satisfied with the system and this satisfaction encourages them to use it. The influence of user information satisfaction on system use as opposed to the influence of system use on user information system satisfaction was documented by Baroudi et al. (1986).

The correlation analysis also revealed other interesting findings that might be explored in future research. In this study, four significant positive correlations among influence factors were found. The correlation matrix for the influence factors is presented in Table 7. The first result indicated that the level of an AIS personnel capability related to his or her involvement in the systems development process ($r = .3126$, $p < .05$). It suggests that users with computer experience are more at ease participating in IS activities. Based on this finding, it is argued that the capability of AIS personnel has indirect effect on AIS performance. As demonstrated by the result of this study the higher the degree of capability of AIS personnel the more they involve in AIS development and, in turn, the more they involve in AIS development the more they satisfy with the system ($r = .3655$, $p < .01$).

Table 7. Correlation Coefficients among Influence Factors (n=45)

Influence Factors	Influence Factors		
	Capability of AIS Personnel	Organization Size	Management Support
User Involvement	r = .3126 p = .023		
Formalization of IS Development	r = .3334 p = .015	r = .4971* p = .000	r = .5350 p = .000

*n=44, one outlier was deleted

The second finding is the relationship between management support and formalization of IS development ($r = .5350$, $p < .01$). This result corresponded with Lee and Kim (1992) study which found that management concern had direct effect on the procedural formalization of IS. The main areas of top management responsibility towards AIS should be similar to those of other functional areas. Top management with concern for AIS development and related tasks is likely to feel responsible for them. Thus, the procedure of IS development is apt to be more formalized if there is greater top management support.

The third relationship is between formalization of IS development and capability of AIS personnel. It means that in the company which has more capable AIS personnel, the degree of formalization of IS development will increase. The last relationship is between formalization of IS development and organization size. In large organization, formal mechanisms of control generally need to be introduced (Kimberly 1976). Also, larger organizations are more likely to manage IS development due to greater resources and computer experience (DeLone 1981). This re-

sult is similar to the Study of Lee and Kim (1992) which found that size of organization effect the procedural formalization of IS development directly.

Hypothesis 2

The second hypothesis in this study proposed that the AIS performance among companies are different as the results of the existence or nonexistence of a user training and education program, of the presence or absence of a steering committee, and of the independence or the dependence of an IS department location. The results of Mann-Whitney U Test for the difference of AIS performance are presented in Table 8.

The significant differences in AIS performance only exist between the companies that did have steering committees and the others that did not have ones. However, the result is inversely related where the AIS performance is higher in organizations that have no steering committees than that in organizations that have ones. Therefore, it opposed much of the literature that stressed the usefulness of these committees from a theoretical standpoint (e.g. Carlin 1978; Miller 1977).

Table 8. Mann-Whitney U Test for the Difference in AIS Performance

AIS Performance	Influence Factors		
	User Training and Education	IS Steering Committee	Location of IS Department
User Satisfaction	Mean Rank Not exist: 23.78 (n=19) Exist: 19.79 (n=26) z = -1.0433 2-Tailed P = .2968	Mean Rank Not exist: 24.78 (n=28) Exist: 15.60 (n=17) z = -2.3259 2-Tailed P = .0200	Mean Rank independent: 19.43 (n=25) dependent: 18.37 (n=20) z = -.2942 2-Tailed P = .7686
System Usage	Mean Rank Not exist: 23.03 (n=19) Exist: 20.35 (n=26) z = -.7033 2-Tailed P = .4819	Mean Rank Not exist: 24.07 (n=28) Exist: 16.87 (n=17) z = -1.8358 2-Tailed P = .0664	Mean Rank independent: 18.18 (n=25) dependent: 20.20 (n=20) z = -.5593 2-Tailed P = .5760

The other results are not significant ($p > 0.1$) and thus no significant difference in user satisfaction between companies which do have and those which do not have training and education programs and between companies that have IS departments located independently and those which had IS departments located within another department. Similarly, no significant difference in system usage as the result of the existence or nonexistence of user training and education programs and as the result of the independence or the dependence of IS department location.

The result, which demonstrates no significant difference in system usage between companies that introduce and those that not introduce user training and education programs, is inconsistent with work conducted by Nelson and Cheney (1987) and Sanders and Courtney (1985). Their finding was that with computer related training, the users tend to accept and use computer resources. In contrast, result of this study is consistent with DeLone's study (1988), which found no relation

between user training and IS success. Presumably, the users of AIS in the firms without formal training and education programs acquired the necessary computer skills before they were hired or employed or through informal on-the-job training such as one employee showing another how to execute a specific task. Therefore, it may be advantageous for a company to have at least one personnel with high capability on AIS operated in the company. The presence of these personnel may help other users to use the system correctly.

The result which exhibits no significant difference in AIS performance as a consequence of the independence or the dependence of IS department location agrees with the result in Choe's study (1996). Overall, the above findings do not support the second hypotheses proposed. However, all of these findings are consistent with the findings in Choe's study except for the difference in system usage. Choe uncovered system usage was higher in organizations which introduced training and education programs.

In terms of steering committees, the higher degree of AIS performance in companies without steering committees than in those with steering committees may be induced by the involvement a chairman from top management or a heavy representation from data processing. They may dominate the committee and the committee can be ineffective if forced to deal with operating issues rather than management control or strategic planning issues.

Other Findings from Mann-Whitney U Test

The significant differences in formalization of information system development and in organization size as the results of the presence or absence of user training and education programs, of the existence or nonexistence of steering committees, and of the independence or the dependence of IS department location are found in this study. The results of Mann-

Whitney U Test for the difference of these two variables are presented in Table 9.

As shown in Table 9, formalization of information system development is higher in organizations which have user training and education programs, steering committees, and independent location of IS departments. Therefore, it is worthwhile to introduce user training and education programs, to form IS steering committees, and to place IS department in independent location in order to attain higher degree of IS development formalization. In addition, companies that introduced user training and education programs and steering committees, and those that place their IS departments in independent location tend to have greater size.

Generally, the types of problems faced by small organization are certainly different to those confronting large ones. The difference finds their expression in resource availability and in the degree of formalization of organizational systems.

Table 9. Mann-Whitney U Test for the Difference in Formalization of IS Development and Organization Size

AIS Performance	Influence Factors (Grouping Variables)		
	User Training and Education	IS Steering Committee	Location of IS Department
Formalization of IS Development	Mean Rank Not exist: 17.06 (n=19) Exist: 24.83 (n=26) z = -1.0494 2-Tailed P = .0404	Mean Rank Not exist: 17.54 (n=28) Exist 28.63 (n=17) z = -2.8310 2-Tailed P = .0046	Mean Rank independent: 23.11 (n=25) dependent: 18.37 (n=20) z = -2.8099 2-Tailed P = .0050
Organization Size*	Mean Rank Not exist: 15.88 (n=19) Exist: 24.63 (n=25) z = -2.3032 2-Tailed P = .0213	Mean Rank Not exist: 14.92 (n=28) Exist 31.53 (n=16) z = -4.2782 2-Tailed P = .0000	Mean Rank independent: 22.73 (n=25) dependent: 11.86 (n=19) z = -3.0194 2-Tailed P = .0025

* One outlier was deleted

Larger organization is generally resource rich in human and financial terms, and more developed in terms of structure and functions. Therefore, they are able to carry out training and education programs and as the consequence they may have capable personnel. Moreover, larger organization more aware of the importance of information systems. It encourages them to establish steering committees to guide the IS effort and to establish independent IS department for company-wide coordination and information processing.

Discussion and Conclusion

Results of this study proved empirically that there is a significant relationship between user involvement and system usage as a surrogate of AIS performance. This finding corroborated the observation made by Choe (1996) and Hirschheim (1985) which found that users who are involved in the design and development of an information system will be more inclined to use it than will uninformed users. This result, however, is inconsistent with several studies, which found no relationship between user involvement and system use (King and Rodriguez 1978; Maish 1979).

The commonly held belief that user involvement contributes to more satisfied users receives no support in this study. The following processes may explain the lack of results supporting the relationship between these variables. First, high satisfaction scores can be obtained from users who are not involved in system development. Second, dissatisfaction with current systems can motivate users to become involved with system development, which would help explain why a positive relationship between user involvement and information satisfaction is not found. In-

volvement may eventually lead to better systems and greater user satisfaction, but at the time the users are involved, their satisfaction with current systems may be quite low. However, the existing of conflicting results in the relationship between user involvement and user satisfaction make it difficult to say anything substantial about the relationship between these variables.

Little support in this study is likely due to the limitation of the study. With any study involving the use of a questionnaire, problems may arise in eliciting truthful answers from respondents. There are a number of explanations why respondents may not truthfully express their beliefs. Among other things, respondents may have disinterest in the topic or they merely respond for the sake of “pleasing” the researchers. For these reasons, there exist the possibility that some of the results in this study may not represent the true relationship between influence factors and AIS performance.

The focus of this study was confined to AIS. Hence, the results might be peculiar to AIS. There are various types of information system according to the organizational function and activity and various types AIS such as budget/forecast, product costs, and departmental allocations. If the focus is to be changed, different results may be obtained. Future research should be more specific about the AIS, which will be addressed.

Most of the results in this study were insignificant. These insignificant results may be the outcome of lack of control over the research setting. Future research requires rigorous attention to methodology. It is suggested to conduct longitudinal studies to track a series of organizations as they move over time, experience technological, user educational needs, and other changes.

References

- Anderson, E.E. 1985. Managerial considerations in participative design of MIS/DSS. *Information and Management* 9 (4): 210-207.
- Baroudi, J., M.H. Olson, and B. Ives. 1986. An empirical study of the impact of user involvement on system usage and information satisfaction. *Communication of the ACM* 29 (3) (March): 232-238.
- Brady, R.H. 1967. Computers in top-level decision making. *Harvard Business Review* 45 (4) (July-August): 67-76.
- Bronsema, G.S, and Keen, P.G.W. 1983. Education intervention and implementation in MIS. *Sloan Management Review* 24 (4) (Summer): 35-43.
- Bruwer, P.J. 1984. A descriptive model of success for computer based information systems. *Information and Management* 7 (2): 63-67.
- Carlin, J.W. 1978. A steering committee for equal representation. *Management World* 7 (4) (April): 32-33.
- Cerullo, M.J. 1980. Information systems success factors. *Journal of Systems Management* 31 (12) (December): 10-19.
- Cerveney, R.P., and Sanders, G.L. 1986. Implementation and structural variables. *Information and Management* 11 (4): 191-198.
- Cheney, P.H., R.I. Mann, and D.L. Amoroso. 1986. Organizational factors affecting the success of end user computing. *Journal of Management Information Systems* 3 (1) (Summer): 65-79.
- Choe, J.M. 1996. The relationships among performance of accounting information systems, influence factors, and evolution level of information systems. *Journal of Management Information Systems* 12 (4) (Spring): 215-239.
- Conarath, D.W., and O.P. Mignen. 1990. What is being done to measure user satisfaction with EDP/MIS? *Information and Management* 19 (1): 7-19.
- Cronan, T.P., and Douglas, D.E. 1990. End-user training and computing effectiveness in public agencies: An empirical study. *Journal of Management Information System* 6 (4) (Spring): 21-39.
- DeLone, H.W. 1981. Firms size and the characteristics of computer use. *MIS Quarterly* 5 (December): 65-77.
- DeLone, W.H. 1988. Determinants of success for computer usage in small business. *MIS Quarterly* 12 (1) (March): 51-61.
- DeLone, W.H., and E.R. McLean. 1992. Information systems success: The quest for the dependent variable. *Information Systems Research* 3 (1) (March): 60-94.

- Dickson, G.W., I. Benbasat, and W.R. King. 1980. The management information systems area: Problems, challenges and opportunities. Proceedings of *The First International Conference on Information System* (December): 1-7. E.R. McLean (Ed.). Philadelphia, P.A.
- Doll, W.J. 1985. Avenues for top management involvement in successful MIS development. *MIS Quarterly* 9 (1) (March): 17-35.
- Doll, W.J., and G. Torkzadeh. 1988. The management of end-user computing satisfaction. *MIS Quarterly* 12 (2) (June): 22-31.
- Drury, D.H. 1985. A survey of data processing steering committees. *Information and Management* 9 (1): 1-7.
- Ein-Dor, P., and E. Segev. 1978. Organizational context and the success of management information systems. *Management Science* 24 (10) (June): 1064-1077.
- Ein-Dor, P., and E. Segev. 1982. Information systems: Emergence of a new organization function. *Information and Management* 5 (5): 279-286.
- Franz, C.R., and D. Robey. 1986. Organizational context, user involvement and the usefulness of information systems. *Decision Science* 17: 329-356.
- Gibson, C.F., and R.L. Nolan. 1974. Managing the four stages of EDP growth. *Harvard Business Review* 52 (1) (January-February): 76-88.
- Ginzberg, M.J. 1981. Early diagnosis of MIS implementation failures. *Management Science* 27 (4) (April): 459-478.
- Goodhue, D. 1988. I/S attitudes: Toward theoretical and definitional clarity. *Data Base* (Fall-Winter): 6-15.
- Gremillion, L.L. 1984. Organization size and information system use: An empirical study. *Journal of Management Information Systems* 1 (2) (Fall): 4-17.
- Hamilton, S., and N.L. Chervany. 1981. Evaluating information systems effectiveness. *MIS Quarterly* 5 (4) (December): 79-86.
- Harris, S.E., and J.L. Katz. 1991. Firm size and the information technology investment intensity of life insurers. *MIS Quarterly* 15 (3) (September): 333-352.
- Hirschheim, R.A. 1985. User experience with and assessment of participative systems design. *MIS Quarterly* 9 (4) (December): 295-309.
- Huff, S.L., and M.C. Munro. 1985. Information technology assessment and adoption: A field study. *MIS Quarterly* 9 (4) (December): 327-340.
- Ives, B., M.H. Olson, and J. Baroudi, J. 1983. The measurement of user information satisfaction. *Communications of the ACM* 26 (10) (October): 785-793.
- Ives, B., and M.H. Olson. 1984. User involvement and MIS success: A review of research. *Management Science* 30 (5): 586-603.

- Jarvenpaa, S.L., G.W. Dickson, and G. DeSanctis, G. 1985. Methodological issues in experimental I/S research experiences and recommendations. *MIS Quarterly* 9 (2) (June): 141-156.
- Kimberly, J.R. 1976. Organizational size and the structuralist perspective: A review, critique, and proposal. *Administrative Science Quarterly* 21 (December): 497-571.
- (Kim, J.O., and C.W. Muller. 1981. Factor analysis: Statistical methods and practical issues. *Sage University Paper* 14: Sage Publications.
- King, W.R., and B.J. Epstein. 1983. Assessing information system value. *Decision Science* 14 (1) (January): 34-45.
- King, W.R., and J.I. Rodriguez. 1978. Evaluating management information systems. *MIS Quarterly* 2 (3) (September): 43-51.
- Lee, J.J., and S.H. Kim. 1992. The relationship between procedural formalization in MIS development and MIS success. *Information and Management* 22 (2): 89-111.
- Lehman, J.A. 1986. Organizational size and information system sophistication. *Journal of Management Information System* 2 (3) (Winter): 78-86.
- Lucas, H.C. 1981. An experimental investigation of the use of computer-based graphics in decision making. *Management Science* 27 (7) (July): 757-768.
- Lucas, H.C. 1978. Empirical evidence for a descriptive model of implementation. *MIS Quarterly* 2 (2) (June): 27-41.
- Maish, A.M. 1979. A user's behavior toward his MIS. *MIS Quarterly* 3 (1) (March): 39-52.
- McFarlan, F.W., and J.L. McKenney. 1983. The information archipelago governing the new world. *Harvard Business Review* 61, (4): 91-99.
- Miller, W.B. 1977. How to make the EDP function more effective. *Management Review* 66 (4) (April): 18-2.
- Montazemi, A.R. 1988. Factors affecting information satisfaction in the context of the small business environment. *MIS Quarterly* 12 (2) (June): 239-256.
- Neal, R.D., and M. Rander. 1973. The relationship between formal procedures for pursuing OR/MS activities and OR/MS group success. *Operations Research* 21 (2): 451-474.
- Nelson, R.R., and P.H. Cheney. 1987. Training end users: An exploratory study. *MIS Quarterly* 11 (4) (December): 547-559.
- Nolan, R.L. 1979. Managing information systems by committee. *Harvard Business Review* 57 (2) (March-April): 115-126.
- Nunnally, J. 1978. *Psychometric Theory*. New York: McGraw-Hill.
- Olson, M.H., and B. Ives. 1981. User involvement in system design: An empirical test of alternative approaches. *Information and Management* 4: 183-195.

- Raghunathan, B., and T.S. Raghunathan. 1988. Impact of top management support on IS planning. *Journal of Information Systems* (Spring): 15-23.
- Raymond, L. 1990. Organization context and information systems success: A contingency approach. *Journal of Management Information Systems* 6 (4) (spring): 5-20.
- Raymond, L. 1985. Organizational characteristics and MIS success in the context of small business. *MIS Quarterly* 9 (1) (March): 37-52.
- Robey, D. 1979. User attitude and management information system use. *Academy of Management Journal* 22 (3): 527-538.
- Robey, D. and R.F. Zeller. 1978. Factors affecting the success and failure of an information system for product quality. *Interfaces* 8 (2): 70-78.
- Sanders, G.L., and J.F. Courtney. 1985. A field study of organizational factors influencing DSS success. *MIS Quarterly* 9 (1) (March): 77-92.
- Schultz, R.L. and D.P. Slevin. 1975. A program of research on implementation. In Schultz and Slevin (Eds.) *Implementing Operations Research/Management Science*. American Elsevier, New York: 31-51.
- Tait, P., and I. Vassey, I. 1988. The Effect of user involvement on system success; A contingency approach. *MIS Quarterly* 12 (1) (March): 91-108.
- Thayer, R.H., A.B. Pyster, and R.C. Wood. 1981. Major issues in software engineering project management. *IEEE Transactions of Software Engineering SE-7* (4): 333-342.
- Yap, C.S. 1990. Distinguishing characteristics of organizations using computers. *Information and Management* 18 (2): 97-107.
- Yaverbaum, G.J., and J. Nosek. 1992. Effects of information system education and training on user satisfaction. *Information and Management* 22 (4): 217-225.

Appendix

I. ACCOUNTING INFORMATION SYSTEMS (AIS) PERFORMANCE

A. The Satisfaction of Using Specific Accounting Information Systems (AIS)

Directions:

- (1) Please answer questions 1 and 2 in the space provided,
 (2) For statements 3-13, please circle the number in the scale, which best represents your degree of satisfaction with the system, which is in operation in your department.

1. What department are you in?
 2. What is the name of the Accounting Information Systems, which is used in your department?

	<i>Strongly Disagree</i>			<i>Strongly Agree</i>			
	1	2	3	4	5	6	7
3. The system helps my department function better.	1	2	3	4	5	6	7
4. The system is essential for the successful performance of my department.	1	2	3	4	5	6	7
5. The system has increased my job satisfaction.	1	2	3	4	5	6	7
6. The system always gives the information wanted by my department.	1	2	3	4	5	6	7
7. Other applications (i.e. spreadsheet) can be used to extract and manipulate the information to fulfill requirements	1	2	3	4	5	6	7
8. The system is convenient to use.	1	2	3	4	5	6	7
9. The system has enabled my department to carry out its work more easily and efficiently	1	2	3	4	5	6	7
10. The system has made a contribution to achieving the organisational goals and objectives.	1	2	3	4	5	6	7
11. The majority of employees in my department want to use this system	1	2	3	4	5	6	7
12. The information that this system has been providing is accurate and reliable.	1	2	3	4	5	6	7

	<i>Strongly Disagree</i>				<i>Strongly Agree</i>		
	1	2	3	4	5	6	7
13. The system can be easily adjusted to any new conditions, demands or circumstances that arise now or in the future.							

B. User System Usage

Directions:

For each statement presented, please circle the number in the scale which best represents the circumstances surrounding your use of the Information Systems.

	<i>No Use</i>				<i>Very Frequent Use</i>		
	1	2	3	4	5	6	7
14. The frequency with which I use the Information Systems							

	<i>Reluctant to Use Systems</i>				<i>Most Willing</i>		
	1	2	3	4	5	6	7
15. My willingness to use the department Information Systems							

I. INFLUENCE FACTORS

A. User Involvement in the Development of Specific AIS

Directions:

For each statement presented, please circle the number in the scale which best represents the degree to which you have been involved in the development of the systems which is in operation in your department.

	<i>Very Low</i>				<i>Very High</i>		
	1	2	3	4	5	6	7
16. The degree of my participation in the development of the systems is:							

17. The degree of my influence in the development of the systems is:	1	2	3	4	5	6	7
--	---	---	---	---	---	---	---

B. User Training and Education

Directions:

For question 18, please tick () the relevant box, which corresponds to your answer. For question 19 please circles the number in the scale which best represents the usefulness of the training program.

18. Does your company or department have a training and education program Yes No, proceed to Question 20 to teach staff how to correctly use the systems?

	Very Low						Very High
19. The benefits that I gained from the training and education program.	1	2	3	4	5	6	7

C. Experience, Educational Background, and Capability of Users of AIS, the Existence of Steering Committee, the Location of Information Systems Department and Organization Size

Directions:

For questions 20 to 25, please tick () one of the boxes available, which best represents, your answer to the questions. For questions 26 and 27, please write your answers in the space provided.

20. How long have you used Accounting Information Systems?
 a. Current Systems:
 <1 year 1<3 year 3<5 year 5<7 year <7 year
 b. Other systems:
 <1 year 1<3 year 3<5 year 5<7 year <7 year

21. Does everyone have a degree? Yes No

22. What is your educational background?
Note: If your are still studying please tick the box that best represents the qualification you will gain on completion of your course
 Undergraduate, Please indicate your degree eg. Bachelor of Information Management, etc.

 Postgraduate, Please indicate your degree eg. Master of Accounting, Doctor of Business Administration, etc.

Professional, Please indicate your professional education eg. Institute of Chartered Accountants in Australia Professional Year Program, etc.

.....

23. Would you describe your technical capabilities as specialist skill or generalist skill?
Note: Specialist skill includes system design techniques related to the system, computer, and model and generalist skill means system analysis technique related to the organization, human, and society.

Specialist skill Generalist skill

24. Does your company have a steering committee for information systems?

Yes No

25. Is the IS department in your company a separate, independent identity or is it located within other departments?

The IS department in my company is independent located within another department

26. How many employees are there in your company?

--	--	--	--	--	--	--	--	--	--

 employees

27. To what industry does your company belong?

III. TOP MANAGEMENT SUPPORT AND FORMALISATION OF INFORMATION SYSTEMS

A. Top Management Support for IS Development and Operation

Directions: For each statement presented, please circle the number in the scale which best represents the actual degree of top management support for information systems development and operation in your company.

	<i>Strongly Disagree</i>				<i>Strongly Agree</i>		
	1	2	3	4	5	6	7
28. Top management is very computer literate.	1	2	3	4	5	6	7
29. Top management has a high expectations in the use of IS.	1	2	3	4	5	6	7
30. Top management actively engages in the planning of IS operations.	1	2	3	4	5	6	7

	<i>Strongly Disagree</i>				<i>Strongly Agree</i>		
31. Top management is very concerned with the evaluations of the performance of IS.	1	2	3	4	5	6	7
32. Top management is very interested in the IS usage rates of user departments.	1	2	3	4	5	6	7

B. Formalization of Information Systems Development

Directions: For each statement presented, please circle the number in the scale, which best represents procedures employed for the formalisation systems development in your company.

Note that formalisation of IS developments means the extent to which the task in the process of system development is systematically documented and actively conforms to the documents.

	<i>Never</i>				<i>Always</i>		
33. Progress report for a project is submitted to the manager of IS department.	1	2	3	4	5	6	7
34. Project documentation in a standardized format is prepared.	1	2	3	4	5	6	7
35. Detailed man-hour recording for each project is prepared.	1	2	3	4	5	6	7
36. Development costs are allocated to individual projects.	1	2	3	4	5	6	7
37. Computer-based information system for the project control is introduced.	1	2	3	4	5	6	7