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# THE MISSING CONCEPTS OF USER PARTICIPATION: An Empirical Assessment of User Participation and Information System Success

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# THE MISSING CONCEPTS OF USER PARTICIPATION

## An Empirical Assessment of User Participation and Information System Success

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**Abstract**

Many authors have hypothesized that user participation is one of the most important factors in the success of information system development (ISD) projects. However, published empirical studies have contained contradictory evidence. We argue that the disparate results can be explained by conceptual and methodological limitations in these studies, and that user participation cannot be evaluated alone, without a parallel analysis of both users' and system analysts' real contribution.

In this paper we present a framework for studying the effects of user and system analyst participation on information system success. We use this framework to make an empirical assessment of 48 large ISD projects carried out in leading Finnish organizations. On the basis of our analyses we argue that the quality, not the quantity, of participation is of key importance. A good balance between both user and systems analyst participation and competence is needed for all phases of the development life-cycle to succeed.

On the basis of these analyses we believe that user participation can be of great value, but we strongly recommend that practitioners emphasize the quality of user participation, instead of relying on its magic power.

*Keywords:* participation, skills, information system success.

# 1 Introduction

User participation has been recognized as one of the most important factors affecting the success of information system development (ISD) projects. However, empirical studies have found contradictory evidence (Hirschheim 1983, Ives & Olson 1984, Koh & Lawrence 1988). As Ives & Olson (1984) argued, the benefits of user participation have not been convincingly demonstrated in academic research. They concluded that the majority of studies have been methodologically flawed, and that these studies have not been able to demonstrate the hypothesized relationship between participation and success.

It is not difficult to find shortcomings in the empirical tests of user participation. On the one hand, the frameworks used, and the measurement of the key concepts of participation and success have often been inadequate. On the other hand, the search for a possible causal relationship on the basis of aggregated variables (for example, participation in general) may have led to contradictory results.

The aim of this paper is to establish whether or not the hypothesized positive association between user participation and ISD project success really exists. We propose a more comprehensive framework for measuring the impact of participation on ISD project success than those used in earlier studies. Our framework takes into account not only users, but also system analysts and their ability to cooperate and communicate with users. We also extend the measurement of success from the well-known User Information Satisfaction (UIS) measure to a three-component instrument which also includes the development process and the impact of the information system. We test our framework using empirical data collected from 48 large development projects.

We based our evaluation on questionnaires sent to project managers and user managers. The managers were considered to be capable of balancing diverging user views in their judgments. User manager views were also emphasized because they are responsible for the supported business and are thus the right people to evaluate the contribution of the information system to organizational performance. We note that our approach may have potential drawbacks, too. User participation may be very important for a user, despite its low impact on the overall success of the information system. Furthermore, managers and employees may have contradictory beliefs and attitudes towards the information system and on the desired extent of user participation (Nilssen 1984).

Our findings indicate that the positive effects of user participation on the ISD project success as reflected in managers' impressions and beliefs depend much more on the quality than on the quantity of participation. The factors describing the quantity of user participation did not correlate significantly with the success measures, while user involvement and skills correlated significantly with many important success variables. Furthermore, it also seems important that systems

analysts' participation and communication skills are taken into account when analyzing the relationship between participation and the success of an information system.

# 2 Earlier Research

## 2.1 ISD Project Success

There are many different views of what the concept of ISD project success really means and how it should be measured (Cherveny & Clark 1981). There is no simple measure of success. Even simple cost benefit analyses of information systems are often difficult, and sometimes even impossible, to perform (Ives & Olson 1984). Consequently, researchers have developed surrogate measures of success. One of the most promising results of this research is the development of a standard measurement instrument called user information satisfaction (UIS—Pearson 1977, Bailey & Pearson 1983). Bailey & Pearson ended up with a 39 item instrument. They developed four scales or adjective pairs for each item. Ives *et al.* (1983) refined this instrument. They simplified it, ending up with only 13 items and two scales for each. This short form of the UIS instrument has been used as a dependent variable in many IS studies (for example Mahmood & Becker 1985, Miller & Doyle 1987, Koh & Lawrence 1988). UIS has also come in for criticism (Chismar *et al.* 1985, Treacy 1985, Iivari 1987). It has been criticized for its theoretical weaknesses, and because it has not been able to pass all the tests in studies replicating the original study. For example, Treacy (1985) found it unreliable, but Baroudi & Orlikowski (1988) found it reliable. In addition, UIS can also be regarded as quite a limited instrument which does not take into account many issues which are important for management. It is also quite a fuzzy instrument, including both detailed information attributes and general statements about participation, service levels and relationships between user and DP departments. Recognizing the attempts to develop new UIS instruments (Doll & Torkzadeh 1988, Similä 1988), we believe UIS is, nevertheless, a reasonable indicator of the quality of an information system.

Besides UIS, many other measures of success have been used in implementation research. These include system usage, perceived success, impact, changes, level of adaptation, system effectiveness, realized goals, payoffs and performance (Ein-Dor & Segev 1977, Hamilton & Chervany 1981, Lucas 1981, Ein-Dor *et al.* 1984, Sanders 1984, Barki & Huff 1985, Kivijärvi 1987, Lyytinen & Hirschheim 1987). Budget and schedule overruns are often used as process-related measures of success (Lucas 1981, McFarlan & McKenney 1983). Ives & Olson (1984) also found system acceptance to be a common success variable. However, this measure seems to be out of date, at least in Scandinavia. Resistance to adopting new technology is no longer high. Lyytinen & Hirschheim (1987) synthesized much of the earlier research by introducing the concept of expectation failure (taken as being the opposite of success), which they argue includes all the rele-

vant measures of success, including correspondence failures, process failures and interaction failures.

Although measurement of the success of information systems has been an object of active research, it is still quite problematic. The measurement of success cannot be based on any single variable, but has to be based on a multi-dimensional approach taking various aspects of success into consideration.

## 2.2 User Participation

User participation can be defined as "participation in the system development activities by a member or members of the target user groups" (Olson & Ives 1981 p. 184). Mumford (1979) classifies user participation according to its depth; as consultative, representative or consensus-type participation. Users should have real power, not just symbolic participation in the development process, and this is best achieved by consensus-type participation. Edström (1977), Ginzberg (1978) and Ives & Olson (1984) have also emphasized that it is only when users have real influence on the development project that user participation has a positive effect on its success. In some studies user participation has been seen as workers' democratic right to influence their own work (Bjørn-Andersen & Hedberg 1977, Mumford 1979). This is supposed to increase acceptance of the system, as well as its quality. On the other hand, Dickson & Simmons (1970) and Guthrie (1972) have identified management participation as essential for success.

According to Ives & Olson (1984), the belief that user participation leads to increased success can be traced to theories of organizational behaviour, especially to theories of participative decision-making and planned organizational change. They found, however, that the results of empirical studies are contradictory. We suggest that one reason for these contradictory results is the vague and narrow conceptions of both user participation and success. In many studies user participation has been measured using self-rating questionnaires (see the review in Ives & Olson 1984). Questions have usually been posed using Likert-type scales. The emphasis has often been on evaluating the average level of user participation in the organization in general or by the respondent. However, there have also been attempts to improve measures of user participation by using mechanisms allowing it to be done in each phase of the development life-cycle (Henderson 1988, Baroudi *et al.* 1986).

Regardless of the methodological problems, it may be that the benefits of user participation depend on the characteristics of the individual development project. Certain types of system and development situation require extensive user participation, while others do not. We believe that the situational adequacy of the participation is of great importance. But there is one more important factor to be considered. De Brabander & Edström (1977) have emphasized the importance of the competence of the system analyst competence for a successful ISD project. This indicates that user participation may not work without competent systems analyst who can communicate and cooperate with users. Thus, to improve our

understanding of participation system analyst participation also has to be taken into account.

Barki & Hartwick (1989) made a distinction between the concepts of user participation and user involvement. User participation means users' effort and influence on the development process. User involvement is defined as "a subjective psychological state reflecting the importance and personal relevance of a system to the user" (Barki & Hartwick 1989, p. 53), which means about the same as commitment. Empirical studies have not made this distinction clear, thus leading to difficulties in interpreting results.

# 3 Frame of Reference

We propose a new framework for the empirical assessment of user participation. The framework, which is illustrated in Figure 1, allows us to study the relationship between both user and system analyst participation and involvement and project success, and also to take into account the skills of both groups.

## 3.1 ISD Project Success

In our framework, ISD project success is measured by a three-component instrument consisting of the development process, the quality of the resulting information system, and the impact of the information system on the organizational variables (Saarinen 1988, Saarinen & Sääksjärvi 1989, Saarinen 1990). In the following, the most important success variables that are relevant in studying the effects of participation are described. The observed means and standard deviations of the detailed variables are given in the Appendix.

The success of the development process is evaluated in terms of budget and schedule overruns, and of the success of each phase of the development life-cycle as perceived by managers.

The quality of the resulting information system is evaluated in terms of the completeness, relevance, precision, accuracy and reliability of the output information (the information attributes of the short-form UIS, Ives *et al.* 1983), ease of use of the system, user friendliness, and maintainability.

The impact of the resulting information system on the organization are evaluated by assessing the achievement of development goals, system usage level, changes (improvements) in work processes, and the profitability of the system.

## 3.2 User and System Analyst Participation

User participation is measured by both quantity and quality-related variables. As indicators of the quantity of participation we used the relative extent of user representation (number of users participating in the project relative to the total number of users of the system), users' share of the total workload of the project (including users, systems analysts and outside consultants), and the adequacy of

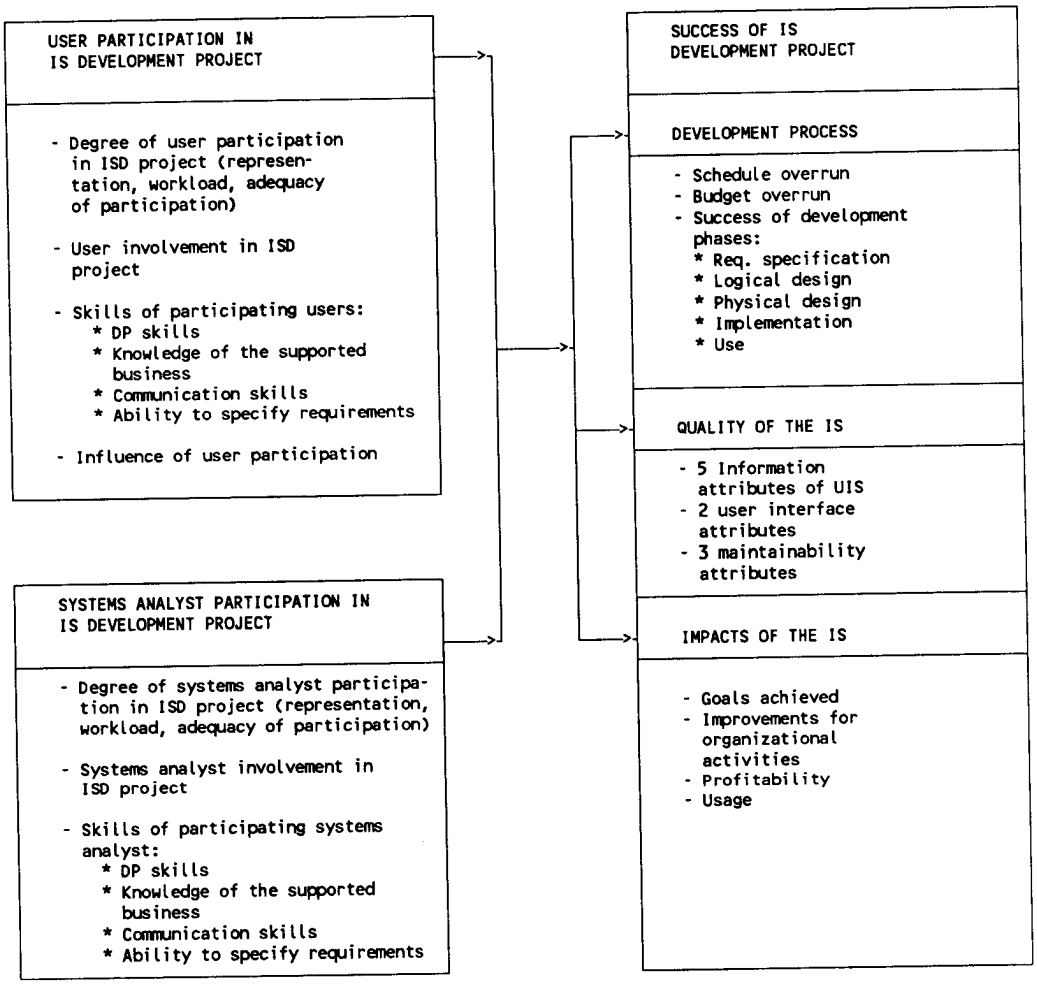


Figure 1: *The framework of the study.*

the participation. The quality of the participation was measured according to the users' involvement in the project, their skills and knowledge, and their ability to communicate and specify requirements.

Systems analyst participation was measured in the same way as user participation, both in terms of quantity and quality.

In order to improve our evaluation, we did not base our estimation of important quality variables on a self-ranking procedure, but asked project managers to assess the skills and involvement of users, and user managers to assess the skills and involvement of the systems analyst participating in the project.

Evaluations of success variables were also collected from both user managers and project managers. We asked project managers to assess the success variables of the development process, and user managers to assess the quality of the system and the impact of information system.

# 4 Methodology

The data for this study were collected in two phases. In the first phase, 272 IS managers from the 200 largest companies and 25 largest banks and insurance companies in Finland were contacted by mail and asked to participate in our study (some companies have an IS manager for every business unit). A short questionnaire was sent to the IS managers, in which we asked for a list of all projects completed in the last two years with a brief evaluation of their success. Within a month, 102 IS managers returned the questionnaire, but in 47 cases no new systems had been brought into use during the last two years. In the remaining 55 organizations, 247 new information systems had been introduced during the last two years. We asked the IS managers to describe the two most recently introduced information systems for our review, and asked them to name the project manager and the user manager responsible for the system, so that we could send questionnaires to them. In this way we got information on 101 information systems for our evaluation.

In the second phase of the data collection, we mailed questionnaires to the project managers and user managers. For the 101 systems 70 project managers and 62 user managers out of 101 responded to our questionnaire. This response rate was a result of two separate reminder letters and several phone calls. We received 48 responses which contained evaluations from both respondent groups. Detailed investigations of these projects assured us that we had a representative sample of all the completed information system development projects carried out in large Finnish companies with regard to both the size and type of the system, the application, and the overall level of success (Saarinen & Sääksjärvi 1989).

# 5 Findings

## 5.1 Profile of the Participating Companies and Information Systems

In 1988 the average net sales of the companies studied was FIM 1906 million per year (FIM 1 = USD 0.25) ranging from FIM 55 million to FIM 28153 million. The average number of personnel was 2317 ranging from 245 to 29276. Around two thirds of the companies were industrial and one fifth were retailers or wholesalers. Less than ten percent of the companies came from banking or insurance, and the rest from the service sector.

The average budget for the information systems studied was FIM 1.2 million (ranging from FIM 50 000 to FIM 10 million), the average duration of the development project was 17 months (from 2 to 70 months), and the average total effort was 41 man months (from 4 to 220 man months). Seventy percent of the information systems were transaction systems, and 30 percent were for decision making or management control. One third of the systems under study were for accounting and one third for marketing. Every fifth system was for manufacturing, and the rest of the systems were for business administration or purchasing.

## 5.2 Impact of Participation on the Success of the Development Process

The correlation between user and system analyst participation and the success of the development process is shown in Figure 2.

The quantity of user participation, extent of representation, and user share of the total workload do not correlate significantly with the success variables. It also seems clear that the measures of the quantity of systems analyst participation are not adequate for determining the success of the project. The quality factors, the involvement and adequacy of the participation (the measure of how sufficient the participation was), also correlate significantly with many of the success variables. The adequacy of user participation seems to be a critical factor in project success.

This might indicate that a good balance is needed between user and systems analyst workloads. In addition, systems analysts must be able to communicate effectively with users in order to understand their needs and to be able to transform them into a successful information system. Our analyses indicate that too many participating users can even cause severe problems for the development project.

## 5.3 Participation and the Quality of the IS

Correlations between participation variables and the information attributes of the UIS instrument are shown in Figure 3.

Again, measures of the quantity of participation, the extent of participation and the share of the total workload seem to have no significant impact on the

| | Schedule overrun | Budget overrun | Req. specif. | Logical design | Physical design | Imple-mentation | Use |
|---|---|---|---|---|---|---|---|
| **USER PARTICIPATION** | | | | | | | |
| Extent of representation | .07 | .23 | .23 | .10 | .05 | .10 | .05 |
| User workload | -.23 | -.13 | .03 | -.14 | .15 | .18 | .01 |
| Adequacy of participation | -.19 | -.19** | .47*** | .38** | .36** | .36** | .26* |
| User involvement | -.25* | -.23** | .32** | .15 | .29** | .40*** | .34** |
| User DP skills | -.21 | -.15 | .22 | .09 | .00 | .06 | .03 |
| User knowledge of supported business | .14 | -.08 | .02 | -.05 | .00 | .06 | .12 |
| User communications skills | -.27* | .05 | .23* | .02 | .18 | -.04 | -.03 |
| User ability to specify requirements | -.07 | .01 | .21 | -.10 | .10 | -.10 | -.19 |
| Influence of user participation | .15 | -.03 | .20 | .21 | .22 | .19 | .26* |
| **SYSTEMS ANALYST PARTICIPATION** | | | | | | | |
| Extent of representation | -.38** | -.06 | .06 | -.17 | .25* | .16 | .15 |
| Systems analyst workload | -.18 | .09 | .03 | .05 | -.02 | .09 | .16 |
| Adequacy of participation | -.37** | -.13 | .22 | .26* | .50*** | .26* | .25* |
| Systems analyst involvement | .00 | -.08 | -.13 | .10 | .19 | .24* | .35** |
| Systems analyst DP skills | .00 | -.06 | -.05 | -.05 | .23 | .22 | .34** |
| Systems analyst knowledge of supported business | .00 | .00 | -.13 | .05 | .19 | .23 | .30** |
| Systems analysts communications skills | -.13 | -.06 | -.28* | -.12 | .12 | .28* | .39*** |
| Systems analyst ability to specify requirements | .01 | .09 | -.28* | .02 | .12 | .17 | .32** |

Figure 2: *Correlations between user and systems analyst participation and process success variables (significance level* $\star\star\star = .01, \star\star = .05, \star = .10$*).*

| | Complete-ness | Relev-ancy | Pre-cision | Accu-racy | Relia-bility |
|---|---|---|---|---|---|
| **USER PARTICIPATION** | | | | | |
| Extent of representation | -.22 | -.19 | -.09 | .04 | -.12 |
| User workload | -.03 | .11 | .24* | .18 | .17 |
| Adequacy of participation | -.20 | -.01 | .15 | .27* | .13 |
| User involvement | -.26* | .02 | .29** | .31** | .21 |
| User DP skills | .22 | .32** | .11 | .00 | .19 |
| User knowledge of supported business | .06 | .19 | .11 | .12 | .20 |
| User communications skills | -.06 | .00 | -.05 | -.05 | -.01 |
| User ability to specify requirements | -.23 | -.13 | -.04 | -.03 | -.08 |
| Influence of user participation | .29 | .55*** | .17 | .01 | .28* |
| **SYSTEMS ANALYST PARTICIPATION** | | | | | |
| Extent of representation | -.17 | .04 | .14 | .15 | .17 |
| Systems analyst workload | -.04 | .19 | .11 | .17 | .20 |
| Adequacy of participation | .12 | .13 | .40*** | .33** | .30** |
| Systems analyst involvement | .22 | .34** | .24* | .10 | .18 |
| Systems analyst DP skills | .08 | .29** | .16 | .09 | .08 |
| Systems analyst knowledge of supported business | .20 | .18 | .26* | .17 | .20 |
| Systems analyst communications skills | .27* | .47*** | .29** | .10 | .23 |
| Systems analyst ability to specify requirements | .17 | .27* | .10 | .03 | .00 |

Figure 3: *Correlations between user and systems analyst participation and information attributes of UIS (significance level* $\star\star\star = .01, \star\star = .05, \star = .10$*).*

quality of the IS. Instead, the adequacy of systems analysts work seem to be a good predictor for the quality of the information content of the system. User involvement and systems analyst communication skills also correlate significantly with many of the quality measures.

It seems that increasing the quantity of user participation alone will not improve user satisfaction with the system. In contrast, the communication skills of the participating systems analysts are of key importance to the quality of the information system.

The correlation between participation and the measures of user interface attributes and the maintainability of the system are shown in Figure 4. These success factors seem to be significantly correlated with all the systems analyst skill variables. By contrast, only a few of the user skill variables seem to affect the quality of the resulting information system. Skilful analysts also seem to be more important for the user friendliness of the system than skilful users. However, user knowledge of the supported business, their communication skills and ability to specify requirements are important for the maintainability of the information system.

### 5.4 Participation and Impact of the System

Figure 5 shows the correlation between the participation variables and the variables measuring the impact of the information system on the organization.

Again, the quantity of participation does not correlate significantly with the impact variables. On the other hand, the adequacy of user participation and user involvement correlate significantly correlated with the achievement of the development goals and with the positive changes (improvements) caused by the system.

Systems analyst skills, involvement and adequacy of participation seem to be of great importance for the success of an ISD project, even more important than user participation. Also, there is a significant correlation between the systems analyst skills and the profitability of the system. This may indicate that the most competent systems analyst are allocated to the most promising projects.

## 6 Conclusions

Our study indicates that the influence of user participation on the success of an information system cannot be evaluated on the basis of the quantity of participation alone. Obviously there is a need for a certain level of user participation. However, the quality of the participation, user involvement and skills may be even more important for success. It is also clear that systems analyst participation, their communication skills and competence have to be evaluated in parallel with user participation. Only then is it possible to obtain a valid picture of the relationship between participation and information system success.

| | Ease of use | User friend-liness | Error correc-tion | Implem. of changes | Adapt. to new requir. |
|---|---|---|---|---|---|
| **USER PARTICIPATION** | | | | | |
| Extent of representation | -.12 | -.23 | .08 | .03 | -.07 |
| User workload | -.19 | -.21 | .18 | -.09 | .04 |
| Adequacy of participation | .01 | .07 | .25* | .05 | .02 |
| User involvement | .02 | .05 | .29** | .12 | .09 |
| User DP skills | -.08 | .14 | .11 | .15 | .13 |
| User knowledge of supported business | .04 | .02 | .39*** | .27* | .35** |
| User communications skills | -.08 | .03 | .27* | .18 | .13 |
| User ability to specify requirements | -.15 | -.15 | .30** | .13 | .12 |
| Influence of user participation | .22 | .55*** | .05 | .18 | .21 |
| **SYSTEMS ANALYST PARTICIPATION** | | | | | |
| Extent of representation | -.22 | -.12 | -.01 | -.07 | -.07 |
| Systems analyst workload | .26* | .26* | .20 | .21 | .03 |
| Adequacy of participation | .12 | .30** | .39*** | .16 | .30** |
| Systems analyst involvement | .36** | .43*** | .39*** | .28* | .37** |
| Systems analyst DP skills | .36** | .34** | .43*** | .30** | .39*** |
| Systems analyst knowledge of supported business | .35** | .39*** | .34** | .25* | .38** |
| Systems analyst communications skills | .44*** | .40*** | .47*** | .46*** | .66*** |
| Systems analyst ability to specify requirements | .60*** | .38** | .31** | .20 | .34** |

Figure 4: *Correlations between user and systems analyst participation and user friendliness and maintainability attributes (significance level* $\star\star\star = .01, \star\star = .05, \star = .10$*).*

| | Goals achieved | Improve-ments | Profit-ability | Usage |
|---|---|---|---|---|
| **USER PARTICIPATION** | | | | |
| Extent of representation | -.23 | .17 | .03 | .15 |
| User workload | .00 | -.13 | .14 | -.10 |
| Adequacy of participation | .39*** | .50*** | .10 | .24* |
| User involvement | .35** | .40*** | .18 | -.06 |
| User DP skills | .24* | .09 | .05 | .00 |
| User knowledge of supported business | .13 | -.03 | .11 | .02 |
| User communications skills .19 | .12 | -.06 | -.10 | |
| User ability to specify requirements | .05 | .05 | -.13 | -.16 |
| Influence of user participation | .37** | .30** | .23 | .00 |
| **SYSTEMS ANALYST PARTICIPATION** | | | | |
| Extent of representation | -.04 | .01 | .27* | -.05 |
| Systems analyst workload | .17 | -.04 | -.03 | -.07 |
| Adequacy of participation | .27* | .27* | .06 | .15 |
| Systems analyst involvement | .37** | .36** | .45*** | -.09 |
| Systems analyst DP skills | .41*** | .46*** | .26* | .16 |
| Systems analyst knowledge of supported business | .31** | .45*** | .43*** | .12 |
| Systems analyst communications skills | .51*** | .31** | .37** | .15 |
| Systems analyst ability to specify requirements | .28* | .35*** | .34** | .16 |

Figure 5: *Correlations between user and systems analyst participation and impact variables (significance level* $\star\star\star = .01, \star\star = .05, \star = .10$*).*

We are sure that the earlier contradictory empirical evidence can be explained by these two important observations. Our analyses indicated that systems analyst participation is at least as important a condition for success as user participation. However, we strongly recommend the promotion of user participation, but with much greater emphasis on the commitment and competence of the development team, instead of simply relying on the magic power of participation.

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# Appendix

List of the variables used in the article and their means and standard deviations.

| Variable | Mean | Standard deviation |
|---|---|---|
| USER PARTICIPATION | | |
| Extent of representation (number of users participating/ total number of users * 100) | 36.0 | 30.5 |
| User workload (percentage of total workload) | 23.8 | 20.9 |
| Adequacy of participation (1-7) | 5.42 | 1.55 |
| User involvement (1-7) | 5.04 | 1.67 |
| User DP skills (1-7) | 4.02 | 1.48 |
| User knowledge of supported business (1-7) | 5.68 | 1.33 |
| User communications skills (1-7) | 4.93 | 1.35 |
| User ability to specify requirements (1-7) | 4.72 | 1.41 |
| Influence of user participation (1-7) | 5.52 | 1.16 |
| SYSTEMS ANALYST PARTICIPATION | | |
| Extent of representation (number of systems analyst/ total number of project members * 100) | 56.4 | 22.1 |
| Systems analyst workload (percent of total workload) | 39.0 | 29.4 |
| Adequacy of participation (1-7) | 4.27 | 1.63 |
| Systems analyst involvement (1-7) | 4.76 | 1.73 |
| Systems analyst DP skills (1-7) | 4.89 | 1.59 |
| Systems analyst knowledge of supported business (1-7) | 4.46 | 1.62 |
| Systems analyst communications skills (1-7) | 4.74 | 1.55 |
| Systems analyst ability to specify requirements (1-7) | 4.66 | 1.52 |

| Variable | Mean | Standard deviation |
|---|---|---|
| PROCESS VARIABLES | | |
| Schedule overrun (percent) | 45.6 | 57.5 |
| Budget overrun (percent) | 16.6 | 26.5 |
| Success of requirements specification phase (1-7) | 5.10 | 1.18 |
| Success of logical design phase (1-7) | 5.10 | .99 |
| Success of physical design phase (1-7) | 4.89 | 1.41 |
| Success of implementation phase (1-7) | 5.08 | 1.18 |
| Success of use phase (1-7) | 5.40 | .99 |
| QUALITY OF THE IS | | |
| UIS-attributes: | | |
| Completeness of output information (1-7) | 5.48 | .99 |
| Relevancy of output information (1-7) | 5.13 | 1.07 |
| Precision of output information (1-7) | 5.39 | 1.48 |
| Accuracy of output information (1-7) | 5.32 | 1.36 |
| Reliability of output information (1-7) | 5.39 | 1.25 |
| User interface attributes: | | |
| Ease of use (1-7) | 4.95 | 1.28 |
| User friendliness (1-7) | 5.08 | 1.38 |
| Maintainability attributes: | | |
| Error correction (1-7) | 4.15 | 1.31 |
| Implementation of changes (1-7) | 4.26 | 1.51 |
| Adaptivity to new requirements (1-7) | 4.35 | 1.55 |
| IMPACTS OF THE IS | | |
| Goals achieved (1-7) | 5.21 | 1.11 |
| Improvements (1-7) | 4.62 | 1.07 |
| Profitability (1-7) | 3.89 | 1.35 |
| Usage in relation to goals (1-7) | 5.45 | 1.16 |