Perceptions of Conflict and Success in Information Systems Development Projects

DANIEL ROBEY, LARRY A. SMITH, AND LEO R. VIJAYASARATHY

DANIEL ROBEY is Professor and Chairman of the Department of Decision Sciences and Information Systems at Florida International University. He is the author of three books and numerous journal articles in the fields of information systems and administrative science. His current research deals with the consequences of information systems in organizations and with the process of system development. Professor Robey currently serves on the editorial boards of *Information Systems Research, Organization Science, Accounting, Management and Information Technologies*, and *Information Technology and People*. He earned his doctorate in 1973 from Kent State University. He has previously served on the faculties of the University of Pittsburgh, Marquette University, Gannon University, and the Copenhagen School of Economics and Business Administration.

LARRY A. SMITH is an Associate Professor in the Department of Decision Sciences and Information Systems, Florida International University. He has a Ph.D. in management science from the State University of New York at Buffalo. He also earned an M.B.A. and a Bachelor of Engineering in mechanical engineering from McGill University. Dr. Smith is presently on the editorial board of the *Project Management Journal*. His research is in all areas of project and production management. He was the 1983–84 recipient of the Award for "Teaching Excellence" in the College of Business at Florida International University.

LEO R. VIJAYASARATHY is a doctoral candidate in MIS at the Department of Decision Sciences and Information Systems, Florida International University. He holds an M.B.A. from Marquette University in Milwaukee. His current research interests are in the areas of telecommunications and the planning, development, use, and consequences of interorganizational information systems.

ABSTRACT: Previous research on the development of information systems has focused on the conflicts among participants and the consequences of satisfactory resolution of those conflicts. In this paper, we test a model of conflict during system development [40, 41]. As specified, the model proposed relationships among participation, influence, conflict, and conflict resolution. We extend the model to include project success as an outcome variable. A sample of 84 participants in 17 system development projects in 3 organizations was surveyed. Results support the portions of the model reported earlier [41], show a strong positive relationship between conflict resolution and project success, and show a modest positive relationship between participation and project success.

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THE LITERATURE ON INFORMATION SYSTEM DEVELOPMENT (ISD) identifies many problems in the execution of system building efforts [13, 23, 25, 26, 33, 43, 48]. These range from overruns in project budgets and unmet schedules to the construction of systems that fail to function as designed [50]. While failing systems projects can often be rescued by allocating additional resources to them, such solutions raise development costs and increase skepticism about the payoff from those investments [14, 46].

Some of the problems associated with ISD are attributed to the inability of relevant stakeholders, such as users, to participate in the development process. Accordingly, prescriptions for user participation have accompanied the technical refinements in ISD over the years. Unfortunately, the empirical research on user participation has not consistently supported those prescriptions. Ives and Olson [15] reviewed this literature and concluded that (a) the empirical research lacked theoretical foundations, (b) research results showed mixed support for the proposition that user participation leads to system success, and (c) the majority of studies were methodologically flawed. They suggested that theories of participative decision making and planned organizational change be used to study user participation in systems development.

Since the critical review by Ives and Olson was published, studies by Baroudi, Olson, and Ives [5], and Tait and Vessey [49], among others, have incorporated some of their suggestions. Others have attempted to reconceptualize user participation in various ways. Doll and Torkzadeh [10] used a discrepancy approach [1] to assess the level of user participation, arguing that too much participation could exceed users' willingness or ability to contribute. Also, Barki and Hartwick [4] distinguished between user participation and user involvement. They considered involvement to be a psychological state in which the user considered the system to be both important and personally relevant (see also [17]). This contrasts with the usual approach of treating involvement as a set of activities. Attempts have also been made to represent user participation as a social process, drawing upon theories of process to explain how and why particular events produce certain outcomes [33, 34]. These approaches promise to increase the leverage obtainable from empirical results by strengthening their theoretical basis.

One line of research on user participation focuses on ISD as a political process, involving not only users and technical designers but also top managers, external vendors and consultants, and other interested parties. This approach focuses on differences among the expectations and interests of stakeholders, attributing system failure to unmet stakeholder expectations [25]. The IS literature has provided a good basis for understanding the politics of ISD [13, 22, 25, 27, 28, 38, 42]. Such analyses focus on the strategies and tactics used by stakeholders to influence the ISD process in their favor. To political analysts, ISD is an opportunity for parties to negotiate to

attain outcomes that favor them. Because the stakes in ISD are usually high and have long-term consequences, a high level of political activity during ISD can be expected.

Treating ISD as a political process appears to disregard legitimate superordinate goals that may have guided initial system proposals. The most skeptical position is to mistrust all appeals to superordinate goals and to suspect that individuals are motivated only by their own interests. Because advance demonstration of universal benefits is always problematic, the legitimacy of superordinate goals is hard to establish objectively [22, 32]. Thus, conflicts during ISD may be viewed as "zero-sum" games in which the gains won by one party must be losses suffered by another.

A less skeptical version of the political model allows for the constructive resolution of conflicts that arise during ISD. Rather than conceiving of ISD as a zero-sum game, it is conceived as a "nonzero-sum" game, wherein multiple parties can come away satisfied. Managing conflict to produce such constructive outcomes becomes an important responsiblity, and conflict resolution occupies an important place in the organization and management literature [11, 30, 37, 39, 44]. Thus, despite the presence of conflicting interests among the stakeholders in ISD, it is conceivable that managers or project leaders could facilitate the resolution of conflicts and produce a "win–win" outcome, deemed successful by all parties.

Within the information systems literature, the two models of conflict discussed above have been presented by Robey [38]. Robey and his colleagues have also developed a specific model of conflict during ISD and subjected it to two empirical tests [40, 41]. The model consists of four variables: participation, influence, conflict, and conflict resolution. Participation is treated as a determinant of influence, and influence is treated as a determinant of both conflict and conflict resolution. While a modified form of the model received support in both studies, the relevance of the model to project outcomes was left unexplored. The objectives of this study are to test the refined model and to extend the model to include project success.

The Research Model

THE RESEARCH MODEL IS SHOWN IN FIGURE 1, with the direction of the arrows showing the causal ordering among five variables. The variables in the model are defined as follows [41, pp. 1174–1175]. Participation is defined as the "extent to which members of an organization are engaged in activities related to system development." Participation includes activities that are aimed at providing and obtaining information about the project and contributing to discussions. Influence is defined as the "extent to which members affect decisions related to the final design of an information system." Influence refers to the extent to which a member's suggestions are considered and adopted by the group. Conflict is defined as "manifest disagreement among group members" and implies incompatible goals among group members. Manifest conflicts are distinguished from latent conflicts, which are not directly observable. While latent conflicts play an important role in organizational conflict [37, 39], they are not considered in the present model, which focuses on perceptions of manifest disagreement. Conflict resolution is defined as the "extent to which such disagreements are

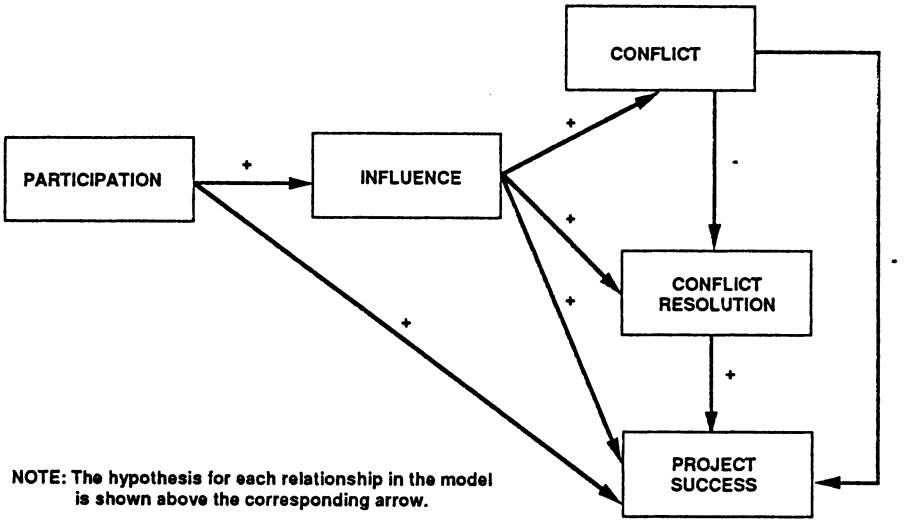

Figure 1. Model of Conflict

replaced by agreement and consensus" and is evident when a solution that is agreeable to all parties is achieved.

Project success is defined as the extent to which the project team is productive in its task and effective in its interactions with non-team members. Project success includes the team's compliance with budgets and schedules. Project success is an important outcome often neglected in research on information systems, despite its implications for the timeliness and efficiency of project work and for the social satisfaction of team members. Project success differs from system success, which has been the outcome of primary interest to researchers studying user involvement [15]. System success has been operationalized in terms of system quality [20, 21, 36], system usage [23, 24, 47], user behavior and attitudes [9], and user satisfaction [17, 19, 35, 45].

While it is plausible that successful projects lead to successful systems, the empirical investigation of that relationship is beyond the scope of this study. There is no demonstrated empirical linkage between project success and system success, although a connection seems plausible. It is unlikely, for example, that unsuccessful projects would produce successful systems, although it is conceivable that successful projects might produce unsuccessful systems. Our choice of project success as a construct in this study is primarily based on our ability to obtain valid data from personnel on project teams. Relatively few of the members of our sample were actual users or operators and were therefore less able to provide valid information on system usage or success.

Relationships Predicted by the Model

The model in figure 1 depicts the hypothesized relationships among the research variables. Participation is positively associated with influence. This relationship is

based on the assumption that participation by group members is needed before influence can be exerted within the group. Clearly, members outside the group might influence group members without formally participating, but in general a positive relationship between participation and influence is expected and has been supported in previous tests [40, 41].

Influence is positively associated with conflict and with conflict resolution. Unless group members have influence in a group, they may be reluctant to confront goals that they perceive to be incompatible with their own. Influence is associated with conflict because it is likely that group members will exert their influence to attain their interests. In the case of high influence exerted by a single member of a group, manifest conflicts are unlikely to result because other members are dominated. However, the model suggests that where multiple members exert influence, then total influence will be higher than in the case of dominance. Thus, more influence (from more members) is positively related to more conflict.

Influence is also necessary to bring about constructive resolutions to conflict. Without the exercise of influence, parties may not know what each others' interests are. Conflict resolution depends on each party asserting its interests so that consensus or compromise can be achieved through direct give and take. With the role of both stimulating and resolving conflicts, influence comprises the key variable in the model.

We hypothesize that, all things equal, conflict is negatively associated with conflict resolution. Pursuing a strategy of conflict avoidance [39], therefore, may eliminate the need for project teams to raise controversial issues and expend energy to resolve them. The model assumes, however, that ISD projects contain such issues and that they should be resolved via the influence of various parties. As influence increases, so does conflict and the need for conflict resolution. The role of influence as a "double-edged sword" presents a fundamental challenge to those charged with managing project teams.

Participation, influence, and conflict resolution are all positively associated with project success, although success is most dependent upon successful conflict resolution. Conflict is negatively associated with project success because unresolved conflicts are likely to be detrimental to the successful completion of projects.

Assumptions in the Model

In previous research, the model has been applied at both the group and individual levels of social analysis. At the group level, the model may be used to assess the degree to which the set of variables describes and predicts the behavior of a project group or that of several groups. At this level of analysis, individual perceptions of group members may be used to estimate the variables in the model, which are conceived as properties of the group (see [41]). At the individual level, the model describes and predicts individual perceptions of group processes. Thus, data from members of several groups may be used to assess individual perceptions of the relationships among the variables (see [40]). In the former case, perceptions are used as a measure of group properties; in the latter case, perceptions are assessed directly as individual phenomena.

The current study assumes the individual level of analysis. We are interested in individual perceptions of the relationships among participation, influence, conflict, the resolution of conflict, and project success. We are not comparing projects or project groups, mostly because of the small number (seventeen) of projects in which members of the sample were engaged and because of the diversity of projects and firms from which the sample was drawn. Furthermore, we are not interested in the differences among perceptions of persons in different roles in these projects. By restricting the model to the individual level of analysis, our conclusions do not and cannot support statements about group dynamics. However, because all respondents in the study were actually engaged in ISD projects, the results should support valid conclusions about individual perceptions by project members.

The model tested in this research adopts the logical form of a variance model, insofar as it specifies its theoretical units as variables rather than events [29, 31]. Predictor variables are specified as accounting for variation in outcome variables. In figure 1, arrows between circled constructs clearly designate these assumed causal relationships.

Method

Sample

DATA FOR THE STUDY WERE COLLECTED THROUGH A FIELD SURVEY using questionnaires as the research instrument. The target respondents were project team leaders, team members, and intended users of seventeen ISD projects in three organizations: a large public utility company, a large systems consulting firm, and a large insurance company. Table 1 provides information on the companies and projects. The six projects listed under the system consulting firm were performed in different client firms, whereas the utility company's and insurance company's projects were all within the respective firm. We conducted *t*-tests to test for differences in responses between the companies, and no significant differences were found between them for any of the five variables in the study.

One individual in each organization was selected to receive the questionnaires, distribute them to the project leaders, and collect them within two days. All questionnaires were packaged and coded by project name and distributed to the project leaders. For projects 1–12 (see Table 1), all distributed questionnaires were returned. For projects 13–17, responses were collected from team leaders only. Eighty-nine completed questionnaires were returned. Of this total, five were discarded due to insufficient data. The remaining eighty-four responses were used in the data analyses.

The composition of the sample, as revealed in Table 1, is unusual in two respects. First, relatively few users were involved as team members in these ISD projects. Thus, our results are unable to provide much support for propositions about the effects of involving users. Second, several projects show more than one leader. It is plausible

Table 1 System Development Projects in the Companies that Provided Data for the Study

Project number		Role: Team Leader	Team Member	User	Unknown	Total
	Utility Company					
1.	payroll and personnel system	1	4	3	0	8
2.	systems conversion project	1	3	0	0	4
3.	corporate budgeting project	1	6	0	0	7
4.	tax project	1	5	0	0	6
5.	load management system	2	7	0	0	9
6.	transmission substation management system	0	3	0	0	3
7.	yield management system	1	3	0	0	4
	Systems Consulting Firm					
8.	human resources personnel and benefits systems	2	6	2	0	10
9.	high priority implementation enhancement project	3	2	0	0	5
10.	enhancement to a payroll/ personnel system	1	2	0	0	3
11.	accounts payable software package	2	9	0	1	12
12.	project tracking software project	2	6	0	0	8
13.	capacity plan for mainframe hardware	1	0	0	0	1
	Insurance Firm					
14.	purchase order control system	0	1	0	0	1
15.	unspecified implementation	0	1	0	0	1
16.	contract negotiations	0	1	0	0	1
17.	on-line policy claims pilot	0	1	0	0	1
	Total	18	60	5	1	84

for teams to acquire new leadership for a variety of reasons. For example, different leaders might be required at different phases of a project, or leaders might be removed if there are problems. Unfortunately, we are unable to explain the reasons for

multiple-leader projects because of the sampling method used. The role designations in Table 1 simply reflect the reported data we received, without further explanation.

Measures

All variables in the study, with the exception of project success, were measured using multiple-item scales developed by Robey et al. [41]. Project success was measured with the six questionnaire items shown in the appendix, which were drawn from the literature on project management (e.g., [8, 12]). The questions reflect standard concerns associated with the efficiency and quality of project work as well as the effectiveness of interactions with people outside of the team. Success items asked respondents to rate their projects on each characteristic, using a five-point scale ranging from "very high" to "very low."

Reliability

Table 2 shows the mean, standard deviation, the number of items, and standardized alpha for each of the research variables. The reliabilities obtained for the participation, influence, conflict, and conflict resolution scales are consistent with those obtained by Robey et al. [41], and all reliabilities exceed 0.75. The measure of project success was also reliable (alpha = 0.82).

Validity

The validity of the measures was first examined using principal components analysis with varimax rotation. Application of scree tests suggested that a single factor be interpreted for each scale. Separate factor analyses were performed on the success scale to explore possible multidimensionality. First, an analysis in which the number of factors to be extracted was unspecified produced a single factor solution. The single factor's eigenvalue was 3.17, explaining 52.7 percent of the variance, with each item loading at 0.60 or above. Second, a forced, two-factor solution extracted factors with eigenvalues of 3.16 and 0.97, explaining 52.7 and 16.2 percent of the variance, respectively. The large difference between the eigenvalues of the two factors suggests the treatment of the success measure as a unidimensional construct.

Convergent and discriminant validities were then examined using the multitrait-multimethod (MTMM) approach recommended by Bagozzi and Phillips [3]. The convergent validities of the scales were assessed by examining the interitem correlations of the scales for significance. For the five research variables in this study, all of the interitem correlations for each variable were statistically significant, showing strong convergent validities.

Discriminant validity was assessed by comparing the within-scale item correlations with the across-scale item correlations. Campbell and Fiske [7] advise that, to support discriminant validity, the within-scale correlations should be greater than the across-scale correlations for one-half of all potential comparisons. For the five variables the

Table 2 Descriptive Statistics, Cronbach Alpha, and Intervariable Correlations[1, 2]

Variable	Mean	S. D.	No.of items	Std. Alpha	1	2	3	4
1. Participation	3.30	0.99	3	0.76				
2. Influence	3.55	1.09	4	0.95	0.76			
3. Conflict	2.39	0.94	3	0.76	0.46	0.38		
4. Conflict Resolution	3.63	0.94	3	0.88	0.42	0.57	-0.06	
5. Project Success	3.90	0.71	6	0.82	0.13	0.18	-0.22	0.38

[1] n = 84

[2] The correlation coefficients exceeding 0.256 and 0.183 are significant at the 0.01 and 0.05 levels (one-tailed) respectively.

percentages of comparisons where the within-scale correlations were greater than the across-scale correlations are 82 percent for participation, 100 percent for influence, 93 percent for conflict, 100 percent for conflict resolution, and 96 percent for project success. These results strongly support the discriminant validity of the measures.

Data Analysis

The research model was tested using path analysis [2, 6, 16]. Path analysis is a multiple regression technique that permits the testing of a complete research model. One of the main advantages of path analysis is its ability to indicate the direct and indirect effects of one variable on another. Also, the correlations between any two variables can be decomposed into a sum of simple and compound paths [2]. Path analysis was used to test the initial conflict model [40] and to refine it later [41]. Although alternatives such as LISREL may be used to analyze causal models, the use of path analysis in this study affords a more direct comparison between our results and those from the earlier studies of the model. Path coefficients are readily interpreted as standardized coefficients from regression analysis.

Results

FIGURE 2 PRESENTS THE PATH ANALYSIS RESULTS FOR THE EXTENDED MODEL of conflict (MODEL 1). Simple and multiple regressions were performed to obtain the path coefficients, which are standardized regression coefficients. The coefficients are shown in figure 2 along with the R^2 values and disturbance terms associated with each

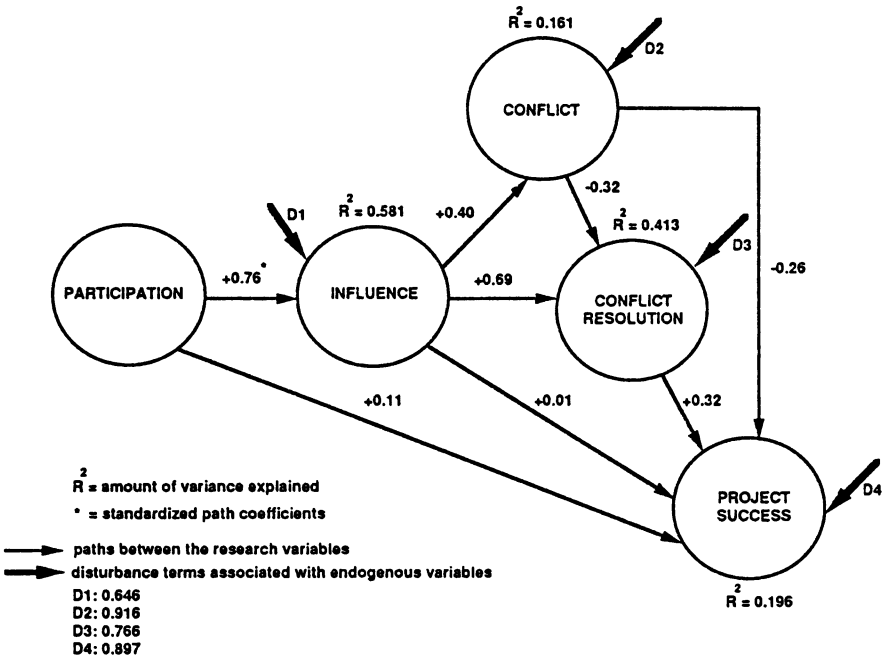

Figure 2. Results of Path Analysis (Model 1)

of the four endogenous variables. The coefficients on each path of the model indicate the relative strength of the association between each pair of variables while considering the influence of other causal paths. D1, D2, D3, and D4 designate disturbance terms, or variations caused by unknown variables not included in the model. For any endogenous variable, disturbance terms are equivalent to $(1 - R^2)^{1/2}$.

Asher [2] suggests that path models be validated by reproducing correlations between variables that have not been directly linked in the path model. If the model has been correctly specified, then the empirical connections between any two variables should be equal to the sum of direct, indirect, and spurious effects between these variables [2]. A tolerance of 0.05 is usually allowed [6, 18].

Using this procedure, the correlation between participation and conflict in MODEL 1 could not be reproduced. This result suggests that MODEL 1 may be an incorrect specification of the relationship among the variables. A simple approach to specifying a new model is to include the path connecting the two variables whose intercorrelation could not be reproduced. In addition to this new path, the path between influence and project success (0.01) was deleted. Billings and Wroten [6] suggest a 0.05 cutoff value for deleting paths in a model. Together, these changes produce MODEL 2, shown in figure 3. Path coefficients and disturbance terms for MODEL 2 were computed using the same procedures as for MODEL 1.

As shown in Table 3, the two correlations involving variables not directly linked in MODEL 2 are successfully reproduced. Unfortunately, MODEL 2 produces another

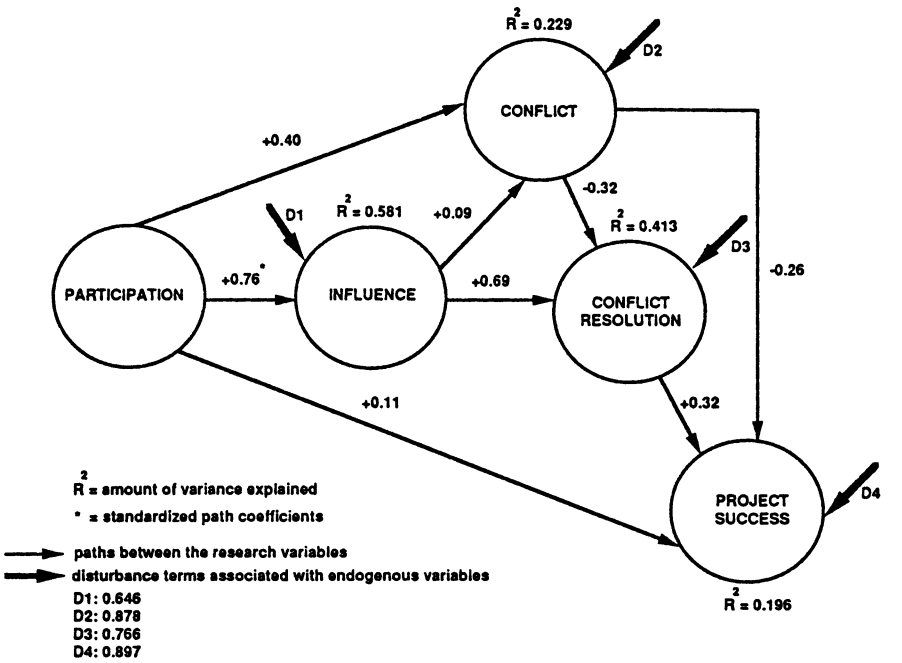

Figure 3. Results of Path Analysis (Model 2)

result that conflicts with the theoretical interpretation underlying MODEL 1's construction. Specifically, the path coefficient between influence and conflict drops from 0.40 in MODEL 1 to 0.09 in MODEL 2. Clearly this is caused by the high zero-order correlation (0.76) between participation and influence. When conflict is regressed on both of these variables, the relative effect of influence decreases. The multicollinearity in the model is a problem preventing the straightforward interpretation of the path coefficients in MODEL 2. Thus, MODEL 2 cannot be accepted as superior, even though all correlations are reproduced within allowable tolerances.

When models that have been revised for statistical reasons do not conform to theoretical rationales of a prior model, Asher and others advise researchers to assess the confidence with which the original model was established. Statistical results should not be given priority over theory. Given the two previous empirical tests of the conflict model, and given the theoretical logic upon which the model is based, we interpret the results to be supportive of MODEL 1 despite the failure to reproduce all of the correlations. MODEL 1 cannot support the zero path coefficient between participation and conflict, but it does preserve the theoretical argument that influence is the key variable affecting both conflict and conflict resolution. If MODEL 2 were accepted, this relationship would have to be reinterpreted.

Because MODEL 1 contains a 0.01 path coefficient between influence and project success, this path is deleted to produce MODEL 3, shown in figure 4. The coefficients in MODEL 3 are virtually identical to those of MODEL 1 with, of course, the removal

Table 3 Reproducing Correlations to Validate the Path Model

Correlation Between	Actual Correlation	Correlation because of Indirect Paths	Spurious Correlation	Total Explained Correlation	Unexplained Correlation
Participation and Conflict Resolution	0.42	0.37[1]	0.00	0.37	0.05
Influence and Project Success	0.18	0.19[2]	-0.03[3]	0.16	0.02

[1]: 0.76*0.69 [for Participation - Influence - Conflict Resolution] + 0.76*0.09*-0.32 [for Participation - Influence - Conflict - Conflict Resolution] + 0.40*-0.32 [for Participation - Conflict - Conflict Resolution]

[2]: 0.69*0.32 [for Influence - Conflict Resolution - Project Success] + 0.09*-0.32*0.32 [for Influence - Conflict - Conflict Resolution - Project Success] + 0.09*-0.26 [for Influence - Conflict - Project Success]

[3]: 0.76*0.11 [for Influence - Participation - Project Success] + 0.76*0.40*-0.26 [for Influence - Participation - Conflict - Project Success] + 0.76*0.40*-0.32*0.32 [for Influence - Participation - Conflict - Conflict Resolution - Project Success]

of the influence–success path. MODEL 3 retains the key theoretical role of influence and is consistent with the data. The only shortcoming of MODEL 3 is its inability to reproduce the correlation between participation and conflict, as discussed earlier.

MODEL 1, MODEL 2, and MODEL 3 support three of the four hypothesized relationships with project success, with path coefficients of the same magnitude. Conflict is negatively related to success, and conflict resolution is positively related to success. The path coefficient between participation and success (0.11 in all three models) is also positive. The coefficient between influence and success in each model is too small to include in the model, although it was hypothesized to be positive. Thus, MODEL 3 supports all but one of the hypotheses involving the success variable.

Further validation of MODEL 3 is provided by comparing the R^2 values for the endogenous variables obtained using the path model with the theoretically maximum R^2 values. For project success the model produces an R^2 value of 0.196. The inclusion of influence results in a minimal increase of 0.001 in R^2. This lends further support for the elimination of a direct path from influence to project success. Similarly, for conflict resolution the model produces an R^2 value of 0.413. The addition of participation increases the R^2 value by only 0.005. This minimal contribution justifies the elimination of a direct path from participation to conflict resolution. The comparisons for the other two endogenous variables, conflict and influence, were unnecessary because the model includes all logically plausible paths for these variables.

Discussion

WITH TWO EXCEPTIONS, THE RESULTS OF THIS STUDY SUPPORT the hypothesized MODEL 1 and are consistent with results obtained in earlier tests [40, 41]. The first exception results from the failure to reproduce the correlation between participation and conflict. We argued for deleting this path on theoretical grounds rather than retaining it for statistical reasons. Thus, our final MODEL 3 contains no direct path

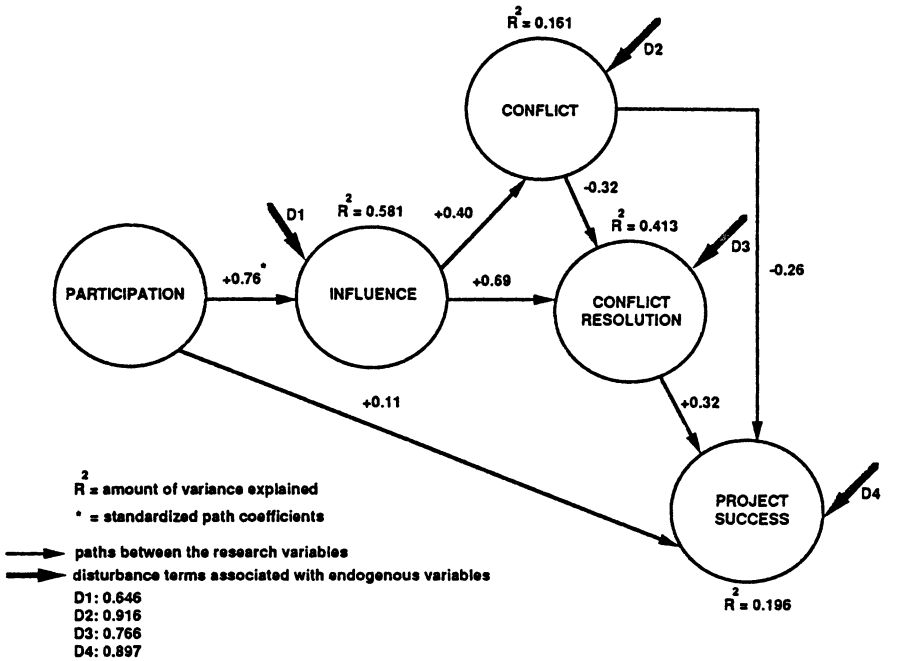

Figure 4. Results of Path Analysis (Model 3)

between participation and conflict. The second exception is the deletion of the hypothesized path between influence and success based on a weak empirical association. Because these results and exceptions are reflected in MODEL 3, our discussion is primarily based on this model rather than on all three models.

The model examined in this paper suggests that constructive conflict plays a role in making ISD projects successful. Influence appears to be instrumental to both the stimulation and resolution of those conflicts, despite its negligible direct effect on project success. This suggests that the exercise of influence may facilitate the open expression of disagreements among group members. The absence of influence may breed reluctance among team members to raise their concerns and objections to proposals that they feel are incompatible with their own proposals. The resolution of conflicts requires that members exercise more influence if solutions are to be accepted by group members. Therefore, the extent to which members are influential in having their suggestions considered affects the extent to which they are accepted by other group members.

As expected, conflict has a negative effect on conflict resolution. This is based on the premise that more conflicts are harder to resolve. However, to the extent that they are resolved satisfactorily, project success may result. Therefore, while some conflict may be beneficial for surfacing and resolving disagreements, a large number of conflicts may overload project members' ability to resolve them, thus reducing project success.

Conflict resolution and, to a smaller degree, participation are positively associated with project success. This is to be expected because the success of a project is largely

dependent on the extent to which incompatible goals are resolved by consensus among project members. Success clearly has other determinants, as the relatively low R^2 of 0.196 indicates. Thus, we cannot assert that resolving conflict is the only ingredient for project success. Rather, approximately 20 percent of the variation in our measure of project success is accounted for by the variables in the model, the most important of which is conflict resolution. Participation also contributes to success, but only modestly. This path in the model corresponds to the early expectations that user participation would lead directly to success [4]. As the model indicates, participation explains relatively little success compared to the more elaborate model with its emphasis on influence and conflict resolution.

Participation is a strong predictor of influence. It is unlikely that members of a project team could exercise influence without participating in the process. Participation's relationship to conflict is less clear and warrants further study. We maintain that conflict is caused most directly by influence, but MODEL 2 indicates the possibility that participation may directly influence conflict. It is also apparent that exogenous influences contribute to conflict, as conflict has the lowest R^2 of any of the variables in MODEL 3. Perhaps factors such as resource availability and project leadership account for conflict as well, preventing a simple strong relationship from finding support within the model. Future research can focus more carefully on this possibility and on the interrelationships among participation, influence, and conflict to sort out causal effects.

Because this study adopts the individual level of analysis and is restricted to measures of individual perceptions, we cannot draw conclusions about the link between these perceptions and actual behaviors. We also cannot conclude that perceptions of project success necessarily correlate with objective indicators of success. However, it is plausible to assume that perceptions of the model's variables are rooted in real experience, especially with a sample of participants from multiple projects in multiple organizations. Thus, we can conclude that conflict and conflict resolution are perceived to be caused by influence, and that project success is perceived to be caused by the successful resolution of those conflicts. Such perceptions, however, should be related to more objective and behavioral indicators of these variables.

Our results should be qualified by the recognition that our sample includes relatively few users. Samples containing a greater proportion of users might find a stronger relationship between participation and project success than we report. Consequently, our findings should not be interpreted as meaning that user participation is unimportant to either project success or system success. Our data cannot support conclusions about either user involvement or systems success because few users responded and we have not measured system success. Clearly, future research should continue to examine the effects of user participation and include measures of systems success.

Our conclusions are also limited because of the rather low R^2 values (and correspondingly large disturbance terms) shown in MODEL 3. While these are certainly within the range of acceptable prediction for the social sciences, they also indicate that unknown influences, outside of the model, exert effects. It is appropriate to speculate on what these might be and to bring new variables into the model. Thus, Robey et al.

[41] suggested that project leadership be included, although we have not included leadership here. Certainly, any model is a simplification of reality—simplification that makes testing and analysis possible—but there are opportunities for greater theoretical elaboration.

Conclusions

IN CONTRAST TO EARLIER RESEARCH ON THE CONFLICT MODEL, none of which included project success, the results reported in this paper show that constructive conflict explains a significant portion of the variation in project success. Participation explains some project success, but relatively little when compared with the influence of conflict resolution. Participation's effect on project success is stronger when it is first converted to influence, which then generates both conflicts and the resolution of conflicts. Of course, there is a risk in generating conflict if it cannot be constructively resolved. Members of project groups may see conflict as reducing project success, even though resolved conflict increases project success. But participation alone does very little, according to the perceptions of respondents in our sample.

When taken with the results of previous research with the model [40, 41], the results in this paper support the key role of participant influence and conflict during ISD. Given the realistic assumption that stakeholders will disagree on fundamental issues during an ISD project, it is important to understand the manner in which conflicts are managed. One approach is to smooth over conflicts by minimizing disagreements among members. This can reduce conflict, but it may result in important issues going unaddressed. If conflicts are encouraged to surface and then resolved constructively, project success is likely to be greater.

Future research can extend the model presented in this paper by demonstrating how conflicts are constructively managed. That is, the behavioral differences between effective and ineffective project leaders can be studied more directly to see how they stimulate and resolve conflict. With results identifying these behaviors, managers and project leaders will be more appropriately equipped to use conflict as a constructive tool in their work in project teams. We hope that the research reported in this paper indicates good reasons to be concerned with both stimulating and resolving conflicts over the course of system development activities.

Future research can also extend the model by studying the relationships betweeen project success and system success. While it makes intuitive sense that successful systems are more likely to be produced by successful project teams, empirical tests are necessary to verify this expectation. It is plausible that teams devoting excessive time to stimulating and resolving conflicts could neglect important efficiencies in their primary tasks. The project management literature suggests that the gains from team activities are potentially offset by "process losses," and that effective team leaders must balance such gains and losses [12]. As our understanding of ISD project teams expands, such considerations should be evaluated empirically.

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APPENDIX: Scale for Measuring Project Success

All items are scored on a 5-point scale, with responses ranging from Very Low to Very High.

1. The amount of work the team produced.
2. The efficiency of team operations.
3. The team's adherence to budgets.
4. The team's adherence to the schedule.
5. The quality of work the team produced.
6. The effectiveness of the team's interactions with people outside the team.