Collective Participation in Organizational Innovation:  
An Empirical Examination of ERP Implementation

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ABSTRACT

Organizational innovation is subject to influences from different levels, including the individual, organizational, and environmental levels. The effect of participation on organizational innovation has received only limited attention from scholars. The primary purpose of this research is to explore the factors that influence the extent of collective participation in implementing organizational innovation. With a paired mail survey, this study investigated a model of group participation in the context of ERP implementation. ERP project leaders and major user managers from 128 manufacturing firms completed the paired questionnaires on participation factors and the success of the ERP system. The results from a Partial Least Squares analysis of the data found that willingness to participate, top management commitment, and commitment to learning contribute to the group cohesion and perceived respect. Both group cohesion and perceived respect, in turn, influence the organizational benefits of the ERP system. The results of the study offer some suggestions for the management of and the research on organizational innovations.

Keywords: Organizational innovation, Collective participation, Group participation, User participation, Enterprise resources planning

I. Introduction

An innovation has been generally described as an idea, material, or artifact perceived to be new by the relevant unit of adoption (Zaltman et al., 1973). In the context of organizations, an innovation can be a new product or service, a new production technology, a new structure or administrative system, or a new program for organizational members. Thus, organizational innovation refers to the “adoption of an internally generated or purchased device, system, policy, program, process, product, or service that is new to the adopting organization” (Damanpour, 1991: p.556). Organizational analysts have identified implementation failure, not innovation failure, as the cause of many organizations’ inability to achieve the intended benefits of innovations they adopt. The fundamental organizational challenge of innovation implementation is to obtain targeted organizational
members’ use of an innovation (Klein and Sorra, 1996; 葉桂珍等，2002). To enhance the productivity and quality of decisions, improve the acceptance of innovations, and lead to better use of innovations, participation of organization members is a significant contributing factor to successful implementation of an organizational innovation (Heller et al. 1998).

Research on participation has addressed a variety of criterion variables and highlights the importance of participation-outcome relationships. Organizational theorists have long emphasized the importance of considering the impact of contextual factors on participation outcomes and researched contextual influences by distinguishing between individual factors and organizational factors (Locke and Schweiger, 1979; Miller and Monge, 1986). Glew and colleagues (1995) suggest that it is critical to examining how individual and organizational factors influence the participation process. Participation research represents a valuable addition to the understanding of organizational innovation. Our research objective here is to explore the role of collective participation in organizational innovation implementation and to investigate the influence of individual and organizational factors on collective participation in organizational innovation implementation.

This research chooses Enterprise Resource Planning (ERP) systems implementation as a template for organizational innovation because ERP, as a software system “being used for the first time by members of an organization, whether or not other organizations have used it previously” (Nord and Tucker, 1987: p.6), can be considered as an organizational innovation. ERP implementation can be further viewed as either a process innovation, which results in changes to the organizational process used to produce a product or render a service (Al-Mashari, 2001; Damanpour, 1991); or an architecture innovation, which destroys the existing knowledge of how specialized subroutines are systemically integrated, while leaving the knowledge underlying those subroutines intact (Henderson and Clark, 1990).

ERP implementation has changed many features of information systems implementation (Willcocks and Sykes, 2000) and raised some unique challenges of ERP projects, such as the difficulty of re-engineering business processes to fit the process that the ERP package supports (Sumner, 2000). Business process reengineering (BPR), which was introduced in the early 1990s, is not a participatory approach and is usually performed by large external consulting firms with limited involvement by organization members. However, implementing new systems to improve business process functions without obtaining effective user participation has previously shown to be problematic (Taylor, 1998); and this problem is predicted to become worse with larger, more comprehensive software applications (Yourdon, 1993). Large-scale projects, such as ERP projects, require higher levels of organizational authority and broader organizational participation (Markus et al., 2000). The success of implementing an ERP system depends not only on individual user participation but also on collective participation, that is, the effort exerted by members of the project team in group-based activities aimed at successfully implementing an ERP system. Collective participation may include such activities as consulting for members’ opinions during meetings, asking questions during meetings, and preparing for the meetings (Robey et al., 1989). Our research, therefore, focuses largely on studying the antecedents and consequences of collective participation in the context of ERP implementation. Developing an understanding of the facilitators of collective participation would
enable the adopting firms to maximize their participation’s benefits.

The structure of this paper is as follows. Section 2 discusses the conceptual background and derives the hypotheses. Section 3 describes the research method and measurement, while data analysis and a discussion of the findings are provided in the Sections 4 and 5, respectively. Finally, contributions and limitations are discussed in the concluding section.

II. Conceptual Background and Hypotheses

The literature on information systems points out the significance of participation for the success of systems development (Swanson, 1974). Previous research recommends that the analysis, design and implementation of information systems include group participation (Aladwani et al., 2000; Hunton and Gibson, 1998; Robey et al., 1989); and stakeholder participation, such as user participation (Koh and Heng, 1996; Ravichandran and Rai, 2000; Robey et al., 1993; Saleem, 1996), vendor/consultant participation (Ravichandran and Rai, 2000), or developer participation (Ravichandran and Rai, 2000). Highly participative projects usually show higher involvement in project activities, higher system acceptance, less resistance, and higher development performance (Aladwani et al., 2000; Koh and Heng, 1996; Ravichandran and Rai, 2000; Saleem, 1996).

The influence of user participation on IS development has received considerable research attention in recent years. Many researchers have offered frameworks that articulate a variety of antecedents and consequences of user participation (Hartwick and Barki, 1994; Cavaye, 1995; Lin and Shao, 2000). One significant flaw associated with these frameworks is an emphasis on individual participation while overlooking collective participation during the system development process (Hunton et al., 2001). The results of a longitudinal field experiment by Hunton and Gibson (1998; 1999) show that collective, as compared to individual, user participation resulted in significant greater benefits during the development of accounting information systems. Thompson and colleagues (1998) emphasize that the sustainability of performance gains obtained from collective participation may depend on the degree of cohesion within work groups and the extent to which these work groups are respected by their evaluators.

In addition, researchers have examined the influence of group structure attributes such as group heterogeneity and group-based rewards on participation and performance outcomes (Aladwani et al., 2000). The literature also suggests that manipulating a group’s structural attributes can promote desired behaviors and inhibit undesired behaviors among group members. Accordingly, if individual and organizational attributes affect collective participation and performance, management can manipulate these attributes to obtain desired outcomes.

Based on the conceptual background described above, a group-level participation model of ERP implementation is developed, as depicted in Figure 1. Individual factor (willingness to participate) and organizational factors (top management commitment and commitment to learning) are proposed to influence the outcome of group participation on two sociological dimensions – group cohesion and perceived respect. These two dimensions in turn will contribute to ERP implementation success, which we refer to as an ERP system’s effects on the adopting firm’s organizational benefits and project performance. The rationale for the model is explained in the following sections.
2.1 Group participation and ERP success

The results of early research on user participation and system development success have been inconsistent (Barki and Hartwick, 1994). Some research findings report mixed or no relationship (e.g., Maish, 1979; Powers and Dickson, 1973), whereas others report a positive relationship (e.g., Baroudi et al., 1986; Swanson 1974). In recent studies, collective participation demonstrates a stronger relationship between participation and performance indicators than individual participation does. Hunton and Gibson (1998; 1999), for example, compared collective to individual user participation and found that collective user participation resulted in greater acceptance and use of a discretionary accounting information retrieval system as well as higher levels of satisfaction, organizational commitment and data input quality with respect to a mandatory accounting information system. Aladwani and colleagues (2000) tested a model that describes the relationship between group structural characteristics, group participation and system development group performance. The results of their study provide strong support for the positive, direct impact of group participation on the performance of system development groups.

Thompson and colleagues (1998) investigated the dual roles of cohesion and respect on group decision-making in social and escalation dilemmas. They found that the decision quality of highly cohesive groups who were afforded high respect was greater than either highly cohesive groups with low respect or less cohesive groups with high respect. The authors indicated that high cohesion and high respect groups are more likely to succeed in accomplishing their goals and objectives. Hunton and colleagues (1998) contend that the impact of group cohesion and perceived respect on outcome factors (e.g., system use and performance quality) may not be linear. Furthermore, cohesion and respect are positively associated with performance indicators, particularly in the collective
condition (Hunton et al., 2001).

The precise causal relationships between cohesion, respect, and the performance indicators cannot be articulated with a high degree of certainty. For example, Tyler and Lind (1992) indicate that increased cohesion leads to increased performance, which brings about increased respect, and that increased performance and respect, in turn, reinforce and enhance cohesion. Klein and Mulvey (1995) examine the impact of group cohesion on group performance, reporting that group commitment and group goal difficulty mediate the influence of cohesion on performance. However, Carron (1982) indicated that a highly cohesive group is more likely to achieve its goals and objectives than a group with relatively low cohesion. Cohesive groups have a high degree of group identity (Thompson et al., 1995) and commitment to the group task (Goodman et al., 1987). Group cohesion is reflected in the tendency for a group to stick together and remain united in the pursuit of its goals. Members of a cohesive group have the willingness to sit together and share their common and unique problems and concerns, as well as getting to know each other on a more personal level. As a result, group members were expected to more fully appreciate the others’ positions and were more likely to work together in the future to achieve their personal goals and the team’s objectives. Accordingly, cohesion should be a very important sociological group variable that contributes to the performance gains achieved by the collaborative group participants. Thus, we propose that the extent of group cohesion will be positively related to ERP success reflected on both project performance and organizational benefits.

H1: Group cohesion is positively associated with project performance.
H2: Group cohesion is positively associated with organizational benefits.

Klein and Mulvey (1995) indicate that cohesion may be a necessary but not sufficient predictor of group performance. Hunton and colleagues (2001) introduce another important sociological factor into the equation – perceived respect. Perceived respect refers to “the extent to which a group’s relevant external authorities trust that the group will act in the best interest of the organization, seek advice from the group, and value the group’s collective opinion” (Hunton et al., 2001: p.4). External authorities view the group as an influential entity whose performance can impact the entire organization. Organizational groups are highly sensitive to how they are treated by relevant external authorities (Lind and Tyler, 1988). Groups whose performance is regarded by the organization as important and worthwhile may be more likely to avoid costly escalation of commitment. These groups may be more committed to preserving group interests, rather than serving individual interests. In this sense, groups whose performance is respected by the organization should feel more accountable because they believe that they can – and are expected to – make a difference. In general, accountability increases thoughtful, deliberate decision making (Tetlock, 1992), which, in turn, affects the quality of group decision making. Accordingly, the performance of groups is quite sensitive to the treatment of the group by external authorities (Tyler and Lind, 1992). Consequently, we propose that the extent of perceived respect will be positively related to ERP success, as reflected on both project performance and organizational benefits.

H3: Perceived respect is positively associated with project performance.
H4: Perceived respect is positively associated with organizational benefits.
2.2 Individual factor and group participation

End-users and IS department personnel are two major internal parties that are involved in ERP implementation. Although IS personnel need to learn ERP, end-users know the organizational requirements. Thus it may be desirable for end-users to participate in a project, although there is no guarantee that they will do so. User willingness to participate increases if the ERP system and its output are perceived to be important by the user. User willingness to participate augments a common understanding between end-users and other team members and thus provides a larger pool of potentially useful mutual adjustments. Mutual understanding and adjustment also enhance the propensity for a group to stick together and remain united in the pursuit of its goals. Therefore, we anticipate that group cohesion will be greater when end-users demonstrate stronger willingness to participate in the implementation of the proposed system.

H5: Willingness to participate is positively associated with group cohesion.

2.3 Organizational factors and group participation

Top management commitment to system implementation is a requirement for the provision of funding and adequate human resources (Hirschheim, 1985). Top management translates their commitment into support for IS projects (Jarvenpaa and Ives, 1991). Cavaye (1995) argues that support from top management encourages and enables the participation of users in the development process. We anticipate that support from top management will encourage the group identity and commitment to the group task, which, in turn, will enhance the degree of cohesion within the group. In addition, support from top management shows that the authority trusts that the group will act in the best interests of the organization and that it values the group’s contribution. Hence, top management commitment will be positively related to the extent to which the group is afforded respect by the organization. Thus, it is proposed:

H6: Top management commitment is positively associated with group cohesion.
H7: Top management commitment is positively associated with perceived respect.

By virtue of the complexity and large scope associated with an ERP package, organizations have not yet developed sufficient knowledge and experience with implementing ERP systems. Learning therefore becomes pivotal for effective adaptation to ERP system and efficient improvement in the process of ERP implementation. Commitment to learning refers to the commitment to and support for learning as imbued in the organization’s cultural values (Sinkula et al., 1997). High levels of commitment are associated with high levels of value placed on the ability to learn, sustained through rewards systems that encourage and resources that facilitate learning. Commitment to learning encourages and rewards group members for sharing their knowledge and expertise, as well as contributing the learning of expertise, skills and competencies (Tiwana, 2001). Accordingly, commitment to learning, as a common belief system, provides the direction to encourage group cohesion. In addition, organizational cultures that encourage learning and knowledge-sharing through management support, reward systems, and appropriate resources are more likely to trust that the group will act in the best interest of the organization and value the group’s contribution. Accordingly, we propose that commitment to learning facilitates the extent of group cohesion and
perceived respect.

H$\delta$: Commitment to learning is positively associated with group cohesion.

H$\gamma$: Commitment to learning is positively associated with perceived respect.

2.4 Control variable

It is well accepted that ERP implementation will often vary in the extent of organizational innovation. Some organizations may change their business processes only, others reengineer their existing way of doing business to the best practices, which triggers changes of many kinds, not just in the business processes themselves. Other organizational features (e.g. organizational structure, compensation, organizational culture, training, etc) must also be changed if required (Hong and Kim 2002). The greater the extent of organizational adaptation, the stronger the extent of organizational innovation confronted by the adopting organizations. The extent of organizational adaptation can be expected to shape the nature of organizational innovation and, thus, the nature of collective participation in implementing an ERP system. Accordingly, the hypotheses between individual and organizational factors and group participation were tested after controlling for the potential effects of organizational adaptation resulting from ERP implementation.

III. Research Method

3.1 Sample and data collection

The target of this study is manufacturing companies that have implemented an ERP system. A cross-sectional field survey was conducted to collect data from senior managers from 1000 companies across Taiwan. Our study focused on large and medium-size manufacturing companies to avoid surveying small firms, which are less likely to adopt ERP. The 1,000 largest manufacturing companies in Taiwan listed in the 2002 edition of Commonwealth served as the sample frame.

Data were collected from two types of informants at each participating company to measure the participation factors and the success factors, respectively. This approach ensured that the appropriate person provided perceptions for the study (Hufnagel and Conca 1994); otherwise, “halo effects” or other biases can result if one person provides information for both the independent and dependent constructs. This survey method has been adopted by other IS implementation-related studies (e.g., Thong 2001; Wixom and Watson 2001). Two questionnaires, the ERP Project Manager Questionnaire and the ERP Major User – Manager Questionnaire, were designed for data collection. The first questionnaire was to be completed by the inhouse managers who were administratively responsible for the ERP implementation. This questionnaire requested data on willingness to participate, top management commitment, commitment to learning, group cohesion, perceived respect, and project performance. The second questionnaire was to be completed by senior managers whose department was the major user of the ERP system. This questionnaire requested data on organizational benefits and organizational adaptation.

A total of 1,000 survey packets were mailed to the CIO of each of the companies in the survey sample. The cover letter requested the CIO to distribute the relevant questionnaires to the project leader in charge of the ERP
implementation and to a senior manager whose department used the ERP. Several rounds of follow-up telephone calls and e-mails were made to remind nonresponding businesses to return the survey. One hundred and fifty-four companies responded, giving a response rate of 15.4%. Responses from 26 companies were excluded from the final sample because of no experience in ERP or incomplete data, resulting in 128 usable sets of questionnaires (a project manager survey and a major user survey). In order to assess the possibility of nonresponse bias, the responses were divided into two halves based on the dates of return, and comparisons between the two groups in terms of company assets and industry types were conducted (Armstrong 1977). The result of chi-square tests showed no significant difference between the two groups in either of these variables (Likelihood ratio = 3.043 and 7.123; $p$-value = 0.551 and 0.930). Hence, nonresponse bias should not be a major concern.

3.2 Measurement development

The format and content of the questionnaire were initially developed through an extensive literature review followed by iterative reviews with both practitioners and experienced IS faculty. The draft survey was examined by four MIS managers with extensive experience in ERP implementation to establish face and content validity. The questionnaire was revised according to the comments gathered from the interviews with these managers. The resulting questionnaire was then pretested by 28 companies in the Hsinchu Science Park in Taiwan to examine the reliability and validity of the instrument. This process resulted in some further modifications of the wording of some survey items. Constructs were measured as perceptual items on a five-point Likert scale anchored from (1) “strongly disagree” to (5) “strongly agree.” All the items used in the survey instrument are shown in Appendix A.

Organizational benefits were operationalized using five items that measured the faster information response time, the increased interaction across the enterprise, the accelerated business processes, the improved order management and order cycle, and the lowered inventory levels (Mabert et al., 2000; Palaniswamy and Frank, 2000; Shang and Seddon, 2002). Project performance included questions that asked how well the project was completed on time and on budget while delivering the exact requirements (Wixom and Watson, 2001).

Three items to assess the group cohesion were developed to reflect the interpersonal attraction dimension of cohesion. Interpersonal attraction measures are frequently used to assess cohesiveness of groups (Carron et al., 1995; Hunton et al., 2001). Three perceived respect items were adapted from Hunton and colleagues (2001). This adaptation reflected the unique social setting of the ERP environment.

Willingness to participate was measured with three items which reflect the propensity of users to participate in an ERP project. Top management commitment was operationalized with three items which assessed the extent of the support from top management during the ERP implementation. Commitment to learning is measured by a three-item scale developed and validated in the marketing literature (Sinkula et al., 1997). Because this instrument is context-free, it can be used without adaptation. Commitment to learning has been measured in the context of E-business (Tiwana 2001). Consistent with its definition, this instrument measures managerial support for learning, perceived value for learning, and the emphasis
placed on learning, as inherent in the organization’s culture.

Five items for assessing the organizational adaptation were developed to measure the extent to which the nature of organizational features change as a result of ERP implementation, including the extent of process adjustment, loss of data ownership, change of working relationships, rearrangement of organizational structure, and change of roles and responsibilities (Hong and Kim 2002).

IV. Findings

4.1 Sample characteristics

The characteristics of the responding firms are presented in Table 1. Half of the responding firms were from the computer and electronics industries. Most of the firms had more than 100 employees and annual sales of over NT$1 billion. All of the firms had implemented an ERP package at the time of answering the surveys and nearly 70 percent of the firms had used the ERP systems for more than one year. The time required for implementation in most firms was more than 6 months.

<table>
<thead>
<tr>
<th>Industry</th>
<th>Percentage of Firms</th>
<th>Total Assets (NT$)</th>
<th>Percentage of Firms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food</td>
<td>4.8</td>
<td>Less than $1 Billion</td>
<td>39.7</td>
</tr>
<tr>
<td>Metal</td>
<td>7.2</td>
<td>$1 - $4 Billion</td>
<td>38.9</td>
</tr>
<tr>
<td>Machine &amp; tool</td>
<td>5.6</td>
<td>$4 - $7 Billion</td>
<td>7.1</td>
</tr>
<tr>
<td>Computer &amp; electronics</td>
<td>50.8</td>
<td>$7 - $10 Billion</td>
<td>0.8</td>
</tr>
<tr>
<td>Plastic</td>
<td>2.4</td>
<td>Over $10 Billion</td>
<td>13.5</td>
</tr>
<tr>
<td>Textile</td>
<td>3.2</td>
<td>ERP Usage Experience</td>
<td></td>
</tr>
<tr>
<td>Chemical</td>
<td>5.6</td>
<td>Less than 0.5 year</td>
<td>6.3</td>
</tr>
<tr>
<td>Automobile</td>
<td>7.1</td>
<td>0.5 to 1 year</td>
<td>27.0</td>
</tr>
<tr>
<td>Wood &amp; paper</td>
<td>1.6</td>
<td>1 to 2 years</td>
<td>22.2</td>
</tr>
<tr>
<td>Transportation</td>
<td>0.8</td>
<td>Above 2 years</td>
<td>44.5</td>
</tr>
<tr>
<td>Others</td>
<td>10.9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number of Employees</th>
<th>Percentage of Firms</th>
<th>Implementation Duration</th>
<th>Percentage of Firms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fewer than 100</td>
<td>10.3</td>
<td>6 months or less</td>
<td>7.2</td>
</tr>
<tr>
<td>101 -500</td>
<td>46.0</td>
<td>7 to 12 months</td>
<td>42.2</td>
</tr>
<tr>
<td>501 - 1000</td>
<td>17.5</td>
<td>13 to 24 months</td>
<td>28.9</td>
</tr>
<tr>
<td>1001 - 3000</td>
<td>12.7</td>
<td>Above 24 months</td>
<td>21.7</td>
</tr>
<tr>
<td>Over 3000</td>
<td>13.5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Annual Sales (NT$)</th>
<th>Percentage of Firms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than $1 Billion</td>
<td>9.5</td>
</tr>
<tr>
<td>$1 - $5 Billion</td>
<td>61.9</td>
</tr>
<tr>
<td>$5 - $10 Billion</td>
<td>11.9</td>
</tr>
<tr>
<td>$10 - $30 Billion</td>
<td>8.7</td>
</tr>
<tr>
<td>Over $30 Billion</td>
<td>8.0</td>
</tr>
</tbody>
</table>

Most respondents to the first questionnaire were ERP project leaders (46.7%) and people who had significant knowledge of the ERP implementation, such as ERP staff members (47.5%) or managers in the IS department (5.8%) with a mean of 2 years of ERP project experience. The respondents to the second survey included functional area managers and professionals (47.6%), IS managers (39.7%), and
other employees of the company (12.7%) with a mean of 2.5 years of ERP usage experience.

### 4.2 Statistical analysis

Partial Least Squares (PLS), a structural equation modeling (SEM) technique, was used for testing the research model. PLS is a regression-based technique that originates from path analysis (Wold, 1985); however, it has emerged as a powerful approach to studying causal models involving multiple constructs with multiple indicators. This approach facilitates testing of the measurement model and the structural model simultaneously. The PLS approach was superior to other SEM approaches for this study because of its flexibility for distributional assumptions, its small sample size requirements, and its strength in handling complex predictive models (Chin and Newsted, 1999). The computer program used for this analysis was the PLS Graph version 3.0 (Chin, 2001), and the bootstrap resampling method (500 resamples) determined the significance of the paths within the structural model. The sample size of 128 exceeded the recommended minimum of 45 and was adequate for model testing.

**a. Testing the measurement model**

The testing of the measurement model included the examination of internal consistency, convergent validity, and discriminant validity. Internal consistency of the constructs was evaluated with composite reliability, as defined by Fornell and Larcker (1981). Nunnally’s (1978) recommended level of 0.7 for evaluating composite reliability can be used to assess internal consistency. Convergent validity indicates the degree to which multiple items measuring the same construct agree. Convergent validity is adequate when constructs have an Average Variance Extracted (AVE) of at least 0.5 (Fornell and Larcker, 1981). Convergent validity is also demonstrated when items load highly (loading > 0.5) on their associated factors (Nunnally, 1978). Table 2 presents the results of the tests for internal consistency and convergent validity. The composite reliabilities of all constructs were at least 0.70, except for the factor of project performance (0.67), thus indicating adequate internal consistency. All factor loadings were greater than 0.55 except for one item of project performance. Most of the constructs have an AVE of at least 0.5 except for project performance (0.43). Convergent validity is satisfactory for the constructs in the measurement model.
Table 2  Assessment of the Measurement Model

<table>
<thead>
<tr>
<th>Construct</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Loading</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group Cohesion</strong> (Composite Reliability = 0.85 AVE = 0.66)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GC1</td>
<td>4.05</td>
<td>0.74</td>
<td>0.62</td>
</tr>
<tr>
<td>GC2</td>
<td>3.75</td>
<td>0.75</td>
<td>0.89</td>
</tr>
<tr>
<td>GC3</td>
<td>3.86</td>
<td>0.77</td>
<td>0.88</td>
</tr>
<tr>
<td><strong>Perceived Respect</strong> (Composite Reliability = 0.75 AVE = 0.50)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PR1</td>
<td>3.78</td>
<td>0.75</td>
<td>0.78</td>
</tr>
<tr>
<td>PR2</td>
<td>3.94</td>
<td>0.60</td>
<td>0.59</td>
</tr>
<tr>
<td>PR3</td>
<td>3.91</td>
<td>0.67</td>
<td>0.73</td>
</tr>
<tr>
<td><strong>Willingness to Participate</strong> (Composite Reliability = 0.81 AVE = 0.59)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WP1</td>
<td>3.38</td>
<td>0.87</td>
<td>0.79</td>
</tr>
<tr>
<td>WP2</td>
<td>3.73</td>
<td>0.85</td>
<td>0.74</td>
</tr>
<tr>
<td>WP3</td>
<td>3.80</td>
<td>0.76</td>
<td>0.78</td>
</tr>
<tr>
<td><strong>Top Management Commitment</strong> (Composite Reliability = 0.91 AVE = 0.77)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TC1</td>
<td>4.12</td>
<td>0.73</td>
<td>0.87</td>
</tr>
<tr>
<td>TC2</td>
<td>4.01</td>
<td>0.76</td>
<td>0.91</td>
</tr>
<tr>
<td>TC3</td>
<td>3.97</td>
<td>0.72</td>
<td>0.84</td>
</tr>
<tr>
<td><strong>Commitment to Learning</strong> (Composite Reliability = 0.81 AVE = 0.59)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CL1</td>
<td>3.84</td>
<td>0.71</td>
<td>0.80</td>
</tr>
<tr>
<td>CL2</td>
<td>3.90</td>
<td>0.69</td>
<td>0.88</td>
</tr>
<tr>
<td>CL3</td>
<td>3.98</td>
<td>0.76</td>
<td>0.60</td>
</tr>
<tr>
<td><strong>Organizational Benefits</strong> (Composite Reliability = 0.85 AVE = 0.53)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OB1</td>
<td>4.14</td>
<td>0.50</td>
<td>0.69</td>
</tr>
<tr>
<td>OB2</td>
<td>3.87</td>
<td>0.62</td>
<td>0.69</td>
</tr>
<tr>
<td>OB3</td>
<td>3.94</td>
<td>0.64</td>
<td>0.76</td>
</tr>
<tr>
<td>OB4</td>
<td>3.90</td>
<td>0.60</td>
<td>0.73</td>
</tr>
<tr>
<td>OB5</td>
<td>3.63</td>
<td>0.77</td>
<td>0.76</td>
</tr>
<tr>
<td><strong>Project Performance</strong> (Composite Reliability = 0.67 AVE = 0.43)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PP1</td>
<td>3.30</td>
<td>0.93</td>
<td>0.89</td>
</tr>
<tr>
<td>PP2</td>
<td>3.21</td>
<td>1.21</td>
<td>0.59</td>
</tr>
<tr>
<td>PP3</td>
<td>3.66</td>
<td>0.97</td>
<td>0.38</td>
</tr>
<tr>
<td><strong>Organizational Adaptation</strong> (Composite Reliability = 0.81 AVE = 0.48)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OA1</td>
<td>3.01</td>
<td>0.96</td>
<td>0.48</td>
</tr>
<tr>
<td>OA2</td>
<td>2.79</td>
<td>0.96</td>
<td>0.95</td>
</tr>
<tr>
<td>OA3</td>
<td>3.29</td>
<td>0.92</td>
<td>0.63</td>
</tr>
<tr>
<td>OA4</td>
<td>2.67</td>
<td>0.92</td>
<td>0.57</td>
</tr>
<tr>
<td>OA5</td>
<td>2.38</td>
<td>0.87</td>
<td>0.74</td>
</tr>
</tbody>
</table>
Discriminant validity is the degree to which items differentiate between constructs. Each item should correlate more highly with other items of the same construct than with items of other constructs. For satisfactory discriminant validity, the square root of AVE from the construct should be greater than the variance shared between the construct and other constructs in the model (Chin, 1998). Table 3 lists the correlational matrix, with correlations among the constructs and the square root of AVE on the diagonal. Clearly, the correlation between any two constructs was less than the squared root of AVE by the items measuring the constructs, indicating that the measurement model discriminated adequately between the constructs.

### Table 3  Correlations of latent variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Organizational Benefits</td>
<td>0.73</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Group Cohesion</td>
<td>0.40</td>
<td>0.81</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Perceived Respect</td>
<td>0.35</td>
<td>0.50</td>
<td>0.70</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Commitment to Learning</td>
<td>0.26</td>
<td>0.48</td>
<td>0.48</td>
<td>0.77</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Willingness to Participate</td>
<td>0.27</td>
<td>0.53</td>
<td>0.40</td>
<td>0.36</td>
<td>0.77</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Top Management Commitment</td>
<td>0.38</td>
<td>0.58</td>
<td>0.63</td>
<td>0.44</td>
<td>0.58</td>
<td>0.87</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Project Performance</td>
<td>0.06</td>
<td>0.24</td>
<td>0.19</td>
<td>0.07</td>
<td>0.15</td>
<td>0.19</td>
<td>0.65</td>
<td></td>
</tr>
<tr>
<td>8. Organizational Adaptation</td>
<td>0.09</td>
<td>-0.29</td>
<td>-0.06</td>
<td>-0.12</td>
<td>-0.11</td>
<td>-0.13</td>
<td>-0.08</td>
<td>0.69</td>
</tr>
</tbody>
</table>

Diagonal elements are the square root of Average Variance Extracted.

#### b. Testing the structural model

The test of the structural model includes estimating the path coefficients and the $R^2$ values. The path coefficients, which indicate the strength and direction of the relationships among the variables, should be significant and directionally consistent with expectations. The $R^2$, which represents the proportion of variance in the endogenous variables that can be explained by the antecedents, demonstrates the predictive power of the model. Collectively, $R^2$ and path coefficients indicate how well the model fits the empirical data. To assess whether the main effects were significant, bootstrap resampling was performed. The results are presented in Figure 2.
The effect of group cohesion on project performance is only marginal \( (p < 0.1) \), supporting Hypothesis 1 at the significant level of 0.1. As hypothesized, group cohesion had a significant effect on organizational benefits (path = 0.303), so Hypothesis 2 was supported. The effect of perceived respect on project performance was insignificant; suggesting that Hypothesis 3 was rejected. Perceived respect had a significant effect on organizational benefits (path = 0.203), so Hypothesis 4 was supported. The variables explained 19.4% of the variance in organizational benefits and 6.2% of the variance in project performance. The \( R^2 \) value for project performance was 0.062, suggesting that other important determinants for project performance had been omitted in this model. Willingness to participate, top management commitment, and commitment to learning all contributed to group cohesion, thus supporting Hypotheses 5, 6, and 8. These factors had path coefficients of 0.249, 0.307, and 0.226, respectively, with a total \( R^2 \) of 0.474, as shown in Figure 2. In addition, top management commitment and commitment to learning both contributed to perceived respect, supporting Hypotheses 7 and 9. These factors had path coefficients of 0.521 and 0.253, respectively, with a total \( R^2 \) of 0.446, as shown in Figure 2. Among the three factors, top management commitment was more closely related to group cohesion and perceived respect. In sum, the results of 500 resamples indicated that, except for project performance, all other paths were significant at the 0.05 level.

V. Discussion and Implications

As shown in Figure 2, all individual (willingness to participate) and organizational factors (top management commitment and commitment to learning) have significant effects on the outcome of group participation (group cohesion and perceived respect) in implementing organization innovations. The results have some implications for management. Organizations that intend to implement an innovation should be aware that their participation level is dependent not only on
users’ individual willingness but also on their top management commitment and commitment to learning. Although user willingness to participate can enhance the degree of group cohesion of the project team, it is important for organizations to allocate resources to learn about and support the innovation project in order to maximize group cohesion and perceived respect during the implementation.

Both the group cohesion and perceived respect of an innovation project team are important to the attainment of organizational benefits of the innovation project. The results confirm the previous IS study that collective participation plays a pivotal role in achieving systems objectives. However, most organizations may be concerned with individual stakeholder participation but overlook the importance of collective participation due to tacit nature and management difficulties, so only a relatively small degree of participation effectiveness is realized (Aladwani et al. 2000). Since a collective participation capability is critical to the realization of innovation benefits, it is important for management to develop appropriate participation mechanisms for organizational innovation.

Although the results indicate that group cohesion and perceived respect are significantly positively correlated with organizational benefits of the innovation project, the direct effects of group cohesion and perceived respect on project performance are mixed. This study partially supports the direct effect of group participation on project performance. While this research did not find a significant effect of perceived respect on project performance, the hypothesized effect of group cohesion on project performance was supported at the significance level of 0.01. To some extent, these results appear consistent with the results of practical surveys, which indicate that approximately 90 percent of ERP implementations are late or over budget (Martin 1998) and 70 percent of ERP implementations fail to deliver the anticipated benefits (Al-Mashari 2001). Unlike traditional IS development, group participation probably cannot guarantee the effective management of ERP projects. In addition, given the innovative nature of ERP implementation, the performance of ERP project depends largely on the management of organizational changes because of the problem of misfits (Soh et al., 2000; Hong and Kim, 2001). If organizational barriers are removed, changes are managed effectively, and widespread supports are secured, it is more likely for a project team to complete the project on time and on budget with proper functionality. This phenomenon may be an area requiring further investigation.

VI. Conclusion

The goal of this research was to investigate the ways by which participation benefits could be maximized and the implementation success of organizational innovation could be enhanced. In particular, we were interested in exploring the role of group cohesion and perceived respect as well as their antecedents toward achieving these goals. In terms of individual factors, developing proper user motivation to participate is critical for firms to attain group cohesion. To encourage group participation, firms also must emphasize top management commitment and commitment to learning. Both variables contribute to group cohesion and perceived respect.

Our primary contribution to participation theory lies in developing and substantiating the impact of group participation on performance indicators. This concept also helps advance our knowledge of participation for organizational
innovation. In contrast, previous arguments have emphasized that system success depends on individual-level participation. We find, however, that in the ERP context, system success depends not only on individual participation but also on the group-level participation. We also examine the influence of individual and organizational factors on successful participation in ERP implementation.

There are two research topics which deserve further development to enhance our understanding of collective participation in organizational innovation. First, although willingness to participate, top management commitment, and commitment to learning explain a significant portion of the group participation variance, more research is required to understand the influences of other factors on group participation in organizational innovation. Further research may extend the analysis to explore the role of the organization, the project environment, and the user in facilitating the collective participation in organizational innovation.

Second, group cohesion and perceived respect were the only two dimensions assessed, so a complete analysis of group dynamics is not possible from this study. The literature indicates that there may be many more factors mediating and moderating the relationship between user participation and salient attitudinal and behavioral outcomes. In future studies, researchers should develop and test theoretically-based models that can lead to a richer understanding of the total impact of group participation on individuals, work groups, and organizations.

Acknowledgements:

The authors thank the editor and the two anonymous reviewers for their useful comments on an earlier version of this paper; it has been greatly improved as a result. This research is supported by the R. O. C. MOE Program for Promoting Academic Excellence of Universities under the grant number 91-H-FA07-1-4.

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Appendix A  Survey instrument

Group Cohesion
GC1  ERP 專案成員的意見都受到充分的重視。
GC2  貴公司導入 ERP 系統的過程中，專案成員處處展現出團隊的精神。
GC3  貴公司專案成員對導入 ERP 系統有共同的目標。

Perceived Respect
PR1  貴公司願意配合 ERP 系統而改變企業的流程。
PR2  ERP 導入專案成員均經過充分的授權。
PR3  貴公司願意接受 ERP 導入風險的挑戰。

Willingness to Participate
WP1  使用者部門人員熱衷於 ERP 系統的規劃與導入。
WP2  使用者部門人員參與 ERP 系統規劃與導入的專案團隊。
WP3  在 ERP 導入的過程中出現問題時，都能得到使用者部門人員的回應。

Top Management Commitment
TC1  公司的高層主管相當重視 ERP 系統的導入。
TC2  公司的高層主管認為 ERP 系統的導入對組織營運相當的關鍵。
TC3  高階主管承諾提供穩定的 ERP 系統規劃與導入時所需的資源。

Commitment to Learning
CL1  貴公司普遍認為學習能力是導入 ERP 系統的成功關鍵因素。
CL2  貴公司認為員工學習是一投資而不是費用。
CL3  一旦放棄學習，則 ERP 系統專案可能會失敗。

Organizational Benefits
OB1  ERP 縮短資訊回應時間。
OB2  ERP 加速作業流程。
OB3  ERP 改善訂單管理和訂單處理週期。
OB4  ERP 降低存貨水準。

Project Performance
PP1  貴公司 ERP 專案按預定進度完成。
PP2  貴公司 ERP 專案按預定的預算金額內完成。
PP3  貴公司 ERP 系統完整地具備了它預期的功能。

Organizational Adaptation
OA1  貴公司因導入 ERP 系統，必需大幅調整使用者原來的工作流程。
OA2  貴公司因導入 ERP 系統，許多使用者喪失原來的資料所有權。
OA3  貴公司因導入 ERP 系統，許多使用者認為改變原來的工作關係。
OA4  貴公司因導入 ERP 系統，必需大幅調整原有的組織結構。
OA5  貴公司因導入 ERP 系統，必需大幅調整人事。
組織創新中的集體參與：
企業資源規劃系統導入之實證研究

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國立中央大學資訊管理研究所博士生

王存國
國立中央大學資訊管理研究所教授

摘要
影響組織創新的因素包含有個人、組織、和環境等不同的層次，有關參與對組織創新的影響的研究卻很少受到重視。本研究主要在探索導入組織創新時，集體參與的角色以及影響集體參與的因素。運用成對郵寄問卷調查法，本研究探討導入企業資源規劃系統中團隊參與的角色。128 家製造業的企業資源規劃專案經理和主要使用部門經理完成相關的問卷。Partial Least Squares 的分析發現：參與意願、高階主管承諾、和學習文化對團隊凝聚力和尊重感有正面的影響；而團隊凝聚力和尊重感又對企業資源規劃系統的組織效益有正面的貢獻。研究結果提供許多管理上的建議和組織創新的未來研究方向。

關鍵字：組織創新、集體參與、團隊參與、使用者參與、企業資源規劃