



# Do organizational citizenship behaviors lead to information system success? Testing the mediation effects of integration climate and project management

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## ABSTRACT

We adapted a model in organizational theory to determine whether organizational citizenship behaviors (OCBs) of system implementation teams influenced that organization's integration climate and improved their project management, resulting in successful system implementation. Surveys were elicited from 254 system users in various business organizations that had implemented large-scale IS in the previous year; the analysis of their responses provided support for our model, suggesting that the OCB of the implementation team created a higher level of integration climate and more effective project management, and that these in turn influenced information system success. Implications for researchers and managers are discussed and limitations are identified.

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## 1. Introduction

A significant amount of effort has been directed toward identifying IS success (ISS) factors that can be classified into two streams: social and technical. The first encompasses factors such as setting clear goals, gaining management support, planning user training programs, resolving conflicts, and creating a harmonious climate. The second includes factors such as constructing a suitable IT infrastructure, sharing information and knowledge across organizations, utilizing effective tools and methodologies, assigning competent project members, and managing project resources and schedules [31,33]. Despite this, understanding the behavioral aspect of the implementation team has yet to be determined. During and after implementation, the interaction between users and the team becomes intensive and critical because users' input helps the team configure the IS correctly to reflect the business objectives and the organizational processes. Kaiser and Bostrom [14] found that similarity among members of the development team was positively related to the ISS. At the team member level, technical knowledge and organizational skills such as interpersonal communication and strategic planning have also been

considered to be important determinants of project success [38]. Moreover, responsiveness has been shown to improve users' assessment of the IS and increase adoption of the system. User resistance has also been regarded as one of the major reasons why ERP implementations failed; that is, users' judgment of the system is an essential criterion in the evaluation of ISS. Thus, there is a need to investigate how and how much the implementation team's interaction with users affects the level of ISS. Our study was intended to examine the influence of a specific category of voluntary behaviors exhibited by the implementation team – organizational citizenship behaviors (OCBs) – on the ISS and the mechanisms through which such influence is achieved. OCB has been reported to correlate positively with the quantity and quality of the unit's performance [26,39]. One recent study [18] showed that employee's OCB had a positive impact on change management after a firm implemented an ERP system. Although such voluntary behaviors had never been applied to explain the influence of the IS implementation team on the success of the system, we expected that this exploration would broaden our understanding of ISS.

## 2. Literature review and hypotheses development

A number of organizational theorists [15,32] consider employees' voluntary behavior, such as acting cooperatively, suggesting ways to improve the product, and promoting a positive climate, to be the glue that holds the organization together. Organ [24] termed these efforts OCBs; they are manifested by the activities directed toward other individuals in the workplace or the organization.

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These include helping co-workers, communicating new and critical information, maintaining a conscientious attitude toward the work environment, actively participating in decision processes and discussions, and refraining from complaining about minor irritants.

Research on OCB has utilized a number of models with slight variations in their dimensionality. Organ suggested five dimensions—altruism, courtesy, conscientiousness, sportsmanship, and civic virtue. Van Dyne et al. [36] suggested three—obedience, participation, and loyalty. Previous studies have suggested that the relationship between some dimensions of OCB and organizational performance exists, but inconsistencies occur on which matter most. For example, Podsakoff and MacKenzie [27] found that *sportsmanship* and *civic virtue* had a positive relationship with work unit performance, but *helping behaviors* related negatively to it. In another study, civic virtue was not found to be related to any measure of unit performance. Some of the studies are summarized in Table 1.

In a recent meta-analysis of 133 empirical articles that investigated OCB, LePine et al. [19] found strong relationships among the OCB dimensions. They suggested that further research should conceptualize OCB as a single latent construct rather than as several. We therefore define OCB as having three dimensions:

- The first, *helping behavior*, has been widely studied [28]. It involves voluntarily helping other employees and preventing work-related problems. *Helping behaviors* exhibited by the implementation team include their efforts to voluntarily handle and prevent IS implementation-related problems and to help users learn more about the IS.
- The second, *sportsmanship*, is “a willingness to tolerate the inevitable inconveniences and impositions of work without complaining” [24]. In addition, it refers to a positive attitude that individuals maintain, even when things go wrong, and willingness to sacrifice personal interests for the good of the group. Given the stressful situations the implementation team may

**Table 1**  
Summary of related OCB studies

Citation	Sample	OCB dimensions	Effectiveness operationalized	Findings (direction of significant correlation) <sup>a</sup>
Dunlop and Lee [8]	36 fast food restaurants in Australia	OCB directed toward organization (OCBO)	Supervisor rating of business unit performance (BP) Counter service time (CT) Drive through service time (DT) Unexplained food figures (UF)	OCBO → BP (+) OCBO → CT (ns) OCBO → DT (ns) OCBO → UF (ns)
Ehrhart et al. [9]	2403 soldiers in 31 military units	Helping behavior at unit-level	Combat readiness (CR) Physical fitness (PF) Award rate (AR) M16 range scores (MR)	Helping → CR (ns) Helping → PF (+) Helping → AR (+) Helping → MR (+)
Koys [16]	28 stores in regional restaurant chain	Aggregated OCB	Customer satisfaction (CS) Profitability after controllable expenses (PF)	OCB → CS (+) OCB → PF (+)
Podsakoff and MacKenzie [27]	116 insurance agency units	Helping Civic virtue (CV) Sportsmanship (Sport)	A: Index of sales performance (SP)	Helping → SP (−) CV → SP (+) Sport → SP (+)
Podsakoff et al. [26]	40 paper mill work crews	Helping Civic virtue Sportsmanship	Quantity produced (QN) Quality produced (QL) % of team sales quota (%S)	Helping → QN (+) Helping → QL (+) Helping → %S (+) CV → %S (+) Sport → QN (+) All others (ns)
Walz and Niehoff [37]	30 limited menu restaurants	Helping Civic virtue Sportsmanship	Food cost (FC) Revenue-to-FTE (RF) Operating efficiency (OE) Customer complaints (CC) Customer satisfaction (CS) Overall perceived rating of performance (OP)	Helping → FC (−) Helping → CC (ns) Helping → Others (+) CV → CC (−) CV → Others (ns) Sport → FC (−) Sport → CC (−) Sport → Others (ns)
Yen and Niehoff [39]	24 retail banks in Taiwan	Altruism (Altr) Conscientiousness (Consc) Civic virtue (identification with the company) Interpersonal harmony (IH) Protecting company resources (PR)	Labor costs per employee (LC) Profit per employee (PF) Customer trust in company (CT) Perceived reliability of service (RL) Perceived expertise of employees (EX) Willingness to cooperate (CO)	Altr → LC (−) Altr → PF (+) Altr → CT (+) Altr → RL (+) Altr → EX (+) Altr → CO (+) Consc → PF (+) Consc → RL (+) Consc → EX (+) Consc → CO (+) CV → LC (−) IH → PF (+) IH → CO (+) PR → PF (+) PR → CO (+) All others (ns)

<sup>a</sup> (+): positive relationship at  $p < 0.05$ ; (−): negative relationship at  $p < 0.05$ ; (ns): insignificant relationship.

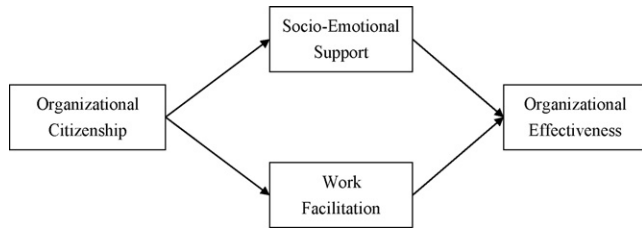


Fig. 1. A model of OCB and organizational effectiveness (adapted from [23]).

encounter, *sportsmanship* seems to be a necessary component of the team’s OCB.

- The third, *civic virtue*, represents commitment to the organization as a whole, was derived from Graham’s [13] concept of “citizens” of an organization as a willingness to participate actively in organizational governance and monitor the environment for possible threats and opportunities even at personal cost. Similar ideas have been described as “organizational participation” and “protecting the organization” [12]. During implementation, team members place a goal of successful implementation above all other aspects of their jobs. Their continued participation reflects a perspective of protecting the organization from failure rather than simply working.

Building upon work (e.g., [8,9]) that supports OCB as a means of positively influencing organizational performance, we argued that the OCB of the implementation team should result in success of the IS. Niehoff [23] suggested that OCB exerts positive influence on organizational performance because it provides socio-emotional support to other employees, and facilitates the work of others. Therefore, employees contribute to organizational effectiveness by building socio-emotional support in the organization and facilitating more efficient work behavior. Fig. 1 exhibits a model of these causal relationships. In the context of IS implementation, socio-emotional support comes from coordination between users and the project team. In our study, we refer to this reciprocal support as the “integration climate.” Similarly, the most important work facilitation is in effective management of the project; using support technologies, identifying clear goals, and assigning tasks to competent team members have been proven to engender ISS [7]. Therefore, we developed our research hypotheses based on Fig. 1.

We hypothesized that OCB will increase the socio-emotional support in the organization by promoting an integration climate during IS implementation. That is, as the team exhibits OCB, users will receive more cooperation and support. The OCB (helping, sacrificing, and participating) will also affect ISS through effective management of the project. The ISS is constructed from three factors: information quality, system quality, and individual impact. Fig. 2 shows our model and hypotheses.

We believed that the OCB of the implementation team would positively influence the perceptions of integration climate (IC) in the organization. As team members exhibit helping, sportsmanship, and civic virtue behavior, users were expected to perceive the implementation climate to be positive, helpful and cooperative. All three OCB dimensions deal with a positive attitude—helpfulness, restraint from complaining, and active engagement. Research into the effects of OCB on customer service perceptions has suggested that employees’ OCB increases customers’ satisfaction in interacting with the system [16]. Thus, we hypothesized:

**H<sub>1</sub>.** The OCB of the implementation team positively influences the perceived integration climate.

We also assumed that OCB exhibited by the implementation team would positively influence the effective management of the project. Prior work has shown that OCB has specific, direct influence on a group’s or a branch’s quality performance [26] and efficiency measures [37]. During IS implementation, there is pressure on the team and users to complete the effort on schedule using appropriate technologies with minimal use of resources. The implementation team’s OCB can contribute to effective project management (EPM) in many ways. Helping behavior provides users with the necessary knowledge and skills. Sportsmanship adds patience that leads to efficient use of time, with less spent in complaining. Civic virtue behaviors demonstrate willingness of the team to participate in user learning. Hence we postulated:

**H<sub>2</sub>.** The OCB of the implementation team will positively influence the EPM characteristics.

Our model proposes that, the influence of OCB on ISS is mediated by IC and the EPM characteristics. ISS can be assessed using a variety of measures, but our focus was on three dimensions of user perceptions: the direct impact of the new system on their personal work; the degree of system improvement on the functioning of the organization; and the information provided by the system being timely, useful, and accurate. Prior work points to the critical nature of cooperation in a successful implementation [35]. Users’ perceptions are affected by the degree to which they work cooperatively during the implementation. It is possible to have EPM, but an unsuccessful project if the client does not perceive the ultimate benefit of the new system. Therefore, the following hypotheses were postulated.

**H<sub>3</sub>.** The perceived integration climate will positively influence the ISS.

**H<sub>4</sub>.** The EPM characteristics will positively influence the ISS.

Finally, we posited that OCB would only influence ISS through its impact on the IC and EMP. The OCB of the implementation team

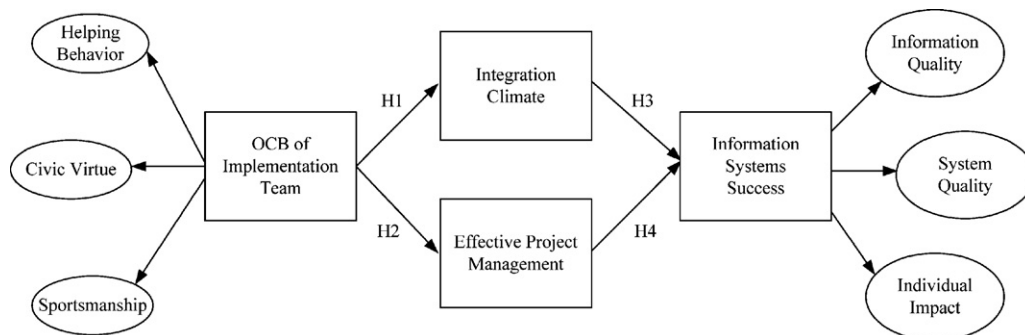


Fig. 2. Research model of information system success.

does not involve specific work behaviors geared to better design or improvement of the system, nor does it require interaction with the organization; it facilitates relationships among team members and sets the tone or culture for the implementation. As such, its effect on the success of the implementation will not be direct. Thus, we posited:

**H<sub>5</sub>.** Integration climate and the EPM characteristics will fully mediate the effect of OCB on the ISS.

### 3. Methods

#### 3.1. Subjects and procedure

We surveyed users in organizations that had implemented a large-scale IS, such as an ERP system, within the prior year. It is important to study a large system because it must support cross-functional or inter-organizational coordination and is used by employees in different departments. Its complexity thus requires more coordination between the implementation team and the users. All subjects were end users of the system and employed during its implementation.

To collect data, we contacted 2000 IS managers from a directory provided by a computer association in northern Taiwan and asked them whether the characteristics of their ERP implementations met our selection criteria. We found 330 qualified implementations. All these had been purchased from software vendors or consulting firms but implemented by internal project teams consisting of IS personnel, users from various departments, and ERP consultants. Subsequently, we mailed three copies of the questionnaire to the human resource manager of each organization asking him or her to distribute them to the users of the intended system. Since our research objectives were to understand the implementation teams' behaviors, we requested that the selected system users had had direct experience in or had observed the implementation. Two months after the questionnaires were sent out, we had collected 156 responses and the human resource managers were asked to make follow-up contacts with non-respondents. After another month, we had received 106 more questionnaires, rendering a total of 262. After discarding eight questionnaires with more than three missing value items, the usable sample consisted of 254 responses: a response rate of 25.7%. Over 80% of the participating users were clerical or front-line service personnel, while managers represented about 17%. One hundred and six respondents (41.7%) were from the manufacturer sector, while 58.3% (148) were from the service sector. Seventy-nine percent of the participants were female—a common phenomenon in the industries surveyed. Approximately 67% of the participants were between 31 and 50 years of age, with the majority (93.6%) holding either a high-school or bachelors degree. Nearly 75% of the participants had direct interactions with or had been asked for advice by the implementation teams, while the rest had observed the whole process. About 74% of the participants had used the systems for more than 6 months, while 10.6% had used it for 3–6 months; the rest had used it for 1–3 months.

#### 3.2. Measures

The measures used in this study were either adapted to fit the context from prior research or developed by the authors. Prior to administering the survey, all measures were reviewed for relevance and clarity of all items by a panel of experts consisting of three academics and four managers; the questionnaire was then pilot tested by the same seven experts and the results analyzed;

each item (see Table 2), except those assessing the two control variables, was measured on a six-point Likert scale, ranging from 1 (strongly disagree) to 6 (strongly agree).

##### 3.2.1. Organizational citizenship behavior

We adapted the items from previous studies [10,24,26]. Following the suggestion of LePine et al., we treated the OCB construct as a second-order construct with three first-order dimensions. In accordance with our research objectives, we followed the measurement approach of Koys and asked the participants to rate the team members as a group for *Helping behavior*. This first-order construct was measured using four items. We also used four items to assess the construct of *Sportsmanship*. Finally, the construct of *Civic virtue* was assessed with three items.

##### 3.2.2. Integration climate

Integration climate (IC) reflects the value placed on supportive, cooperative, and trusting inter-unit relationships in the workplace. We focused on the climate between the implementation team and users of the ERP. Six items from Patterson et al. [25] were used and modified to assess whether the interactions were supportive, collaborative, and trusting.

##### 3.2.3. Effective project management

For our study, EPM involved the process characteristics rather than the consequences of the IS project. As a measure of EPM, we used the characteristics suggested by prior studies [1,17]. Specifically, items were developed to assess: (1) effective utilization of technology and resources; (2) team members' expertise; (3) time management; and (4) goal clarity. For example, the statement, "The goals of the project were clear," was used to assess *goal clarity*.

##### 3.2.4. Information system success

The ISS can be measured in six dimensions: information quality, system quality, system use, user satisfaction, individual impact, and organizational impact [5,6]. The systems implemented by the participating organizations were all ERP systems that had to be used, regardless of user satisfaction. Also, most users were first-line employees who had limited knowledge of the organizational impact of the IS. Thus, asking users to assess system use and the organizational impact would not be sensible. Therefore, we decided not to assess these dimensions and focused instead on *information quality*, *system quality*, and *individual impact of IS*. Subsequently, we developed 14 items from the scales used by DeLone and McLean and Li [20] to assess these three dimensions as first-order factors while treating ISS as a second-order factor.

##### 3.2.5. Control variables

Although all subjects had experienced the IS implementation, their levels of participation varied. We used two items to assess it: the first asked the users whether they participated in the three phases: (1) survey and analysis of needs; (2) system development; (3) system testing and installation. The responses were treated as dummy variables and summed to represent the first participation item (values ranged from zero to three); however, the minimum was one because all respondents had to have participated in at least one of the phases. The second participation item was measured by the degree of interaction between users and the implementation team, ranging from minimal ("I did not have any direct interaction with the implementation team, but have observed the whole process") to high ("I interacted directly with the implementation team"). Another control variable was the user's experience in using an IS which was assessed by asking the

**Table 2**  
Measurement items and scale assessment

Description of scale item	Standardized factor loading
Organizational citizenship behavior: CR = 0.92 <sup>a</sup> ; Cronbach $\alpha$ = 0.91; AVE = 0.75 <sup>a</sup>	
<i>Helping behavior</i> : (2nd order factor loading = 0.850; AVE = 0.72)	
OCB1. The implementation team actively helps the users with work-related problems during the system implementation process	0.840
OCB2. The implementation team voluntarily helps the users to prevent the occurrence of problems related to the information system	0.867
OCB3. The implementation team voluntarily communicates and coordinates with users during the implementation process	0.849
OCB4. The implementation team voluntarily helps the users to adapt the new system	0.842
<i>Civic virtue</i> : (2nd order factor loading = 0.917; AVE = 0.76)	
OCB5. The implementation team often brings up valuable and innovative suggestions about the system to the organization for reference	0.912
OCB6. The implementation team often voluntarily takes on extra responsibilities	0.865
OCB7. The implementation team actively participates in activities that are relevant to the information system	0.817
OCB8. The implementation team keeps up with any environmental changes that might affect the progress of the information system	0.886
<i>Sportsmanship</i> : (2nd order factor loading = 0.838; AVE = 0.72)	
OCB9. The team is willing to tolerate the inconveniences and work turmoil during system implementation process without complaining	0.713
OCB10. The team maintains a positive attitude even when things related to the information system do not seem to meet the team's interests	0.872
OCB11. The team is willing to sacrifice the team's own benefit for the success of system implementation	0.884
Integration climate: CR = 0.89; Cronbach $\alpha$ = 0.90; AVE = 0.68	
IC1. Colleagues and the implementation team were not suspicious of each other	0.727
IC2. Conflicts between implementation team and users were always well resolved	0.841
IC3. There are open communications between the IS team and the users	0.848
IC4. There was effective collaboration between the implementation team and the users	0.863
IC5. Assistance from the implementation team has reduced users' pressure derived from the adaptation of the new system	0.799
Effective project management: CR = 0.89; Cronbach $\alpha$ = 0.88; AVE = 0.62	
EPM1. The IS implementation project phases were kept on schedule	0.774
EPM2. The project adequately used the company's support resources to implement the XXX system	0.800
EPM3. The project team had a good knowledge about the business process of the organization	0.708
EPM4. The goals of the project were clear	0.839
Information system success: CR = 0.96; Cronbach $\alpha$ = 0.96; AVE = 0.77	
<i>Individual impact</i> : (2nd order factor loading = 0.913; AVE = 0.82)	
II1. The system increases my planning capability	0.909
II2. The system enhances my understanding of job-related information	0.849
II3. The system facilitates my use of information to complete tasks	0.909
II4. The system improves the quality of my decision-making	0.964
II5. The system improves my problem diagnosis and problem-solving ability	0.887
<i>System quality</i> : (2nd order factor loading = 0.940; AVE = 0.73)	
SQ1. The system design satisfies users' needs	0.844
SQ2. The system operates efficiently	0.895
SQ3. The system is well integrated with other systems in the organization	0.863
SQ4. The system functions reliably	0.810
<i>Information quality</i> (2nd order factor loading = 0.972; AVE = 0.757)	
IQ1. The system provides accurate information	0.888
IQ2. The system provides timely information	0.869
IQ3. The system provides useful information	0.853

<sup>a</sup> CR = composite reliabilities; AVE = average variance extracted.

subjects how long they had used the system, ranging from "1" (less than 1 month) to "5" (longer than 6 months).

### 3.3. Data representativeness

To assess this, we conducted a series of tests to ensure that there was neither significant non-response bias nor significant differences between demographic groups. For non-response bias, we compared responses between the first and second waves of questionnaires received (153 versus 101 responses). Neither the chi-square test of independence nor the *t*-test of mean differences for each item showed significant differences between the two waves. The same process was applied to different demographic groups (job level, age, gender, industry type) though we did not expect *a priori* that there would be any significant difference. No significant differences were found using chi-square, student's *t*, or ANOVA test, indicating the validity of analyzing the data as a single group. The data analyses used the responses of the entire sample of 252 participants.

## 4. Analyses and results

### 4.1. Measure validation

We first performed exploratory factor analyses for each set of focal constructs to examine the reliability and validity of the measures. There were no problems with them. We then subjected the items to confirmatory factor analysis. Due to low factor loadings, three items were dropped from further analyses—one from the integration climate scale and two from the ISS scale. After dropping these, the analysis resulted in a satisfactory fit between the data and the measurement models (see Table 2). We computed Cronbach's alpha and the composite reliability to assess the reliabilities for all scales. The alpha coefficients and the composite reliability values varied from 0.88 to 0.96, suggesting adequate reliability.

Next, we assessed the convergent and discriminant validity of the measures with two confirmatory measurement models. The first included eight first-order latent variables (helping behavior, civic virtue, sportsmanship, integration climate, EPM, information



**Table 3**  
Descriptive statistics and correlation matrix ( $N = 254$ )

Construct	Mean	Std. dev.	OCB	IC	EPM	ISS
Organizational citizenship behaviors (OCB)	4.12	0.79	(0.87) <sup>a</sup>			
Integration climate (IC)	4.32	0.82	0.74 <sup>***</sup>	(0.82)		
Effective project management (EPM)	4.27	0.74	0.71 <sup>***</sup>	0.70 <sup>***</sup>	(0.79)	
IS success (ISS)	4.03	0.89	0.52 <sup>***</sup>	0.50 <sup>***</sup>	0.64 <sup>***</sup>	(0.88)

<sup>a</sup> Diagonal element indicates the square-root of AVE.

\*\*\* Significant at  $p < 0.001$ .

quality, system quality, and individual impact) with each item loaded only on its theoretical latent construct. The model provided a good fit to the data, with acceptable chi-square ( $\chi^2_{(397)} = 562.970$ ,  $p < 0.01$ ), adjusted chi-square ( $\chi^2/d.f. = 1.42$ ), goodness-of-fit (GFI = 0.88), comparative-fit index (CFI = 0.98), incremental fit index (IFI = 0.98), and root mean square error of approximation (RMSEA = .04). These results support the unidimensionality of the measures. The standardized loadings of construct items were all high ( $>0.710$ ) and significant at  $p < 0.01$  level, indicating the convergence of the indicators to their constructs. Moreover, at 0.62 or higher, the average variance extracted (AVE) for the eight constructs all exceeded the 0.5 criterion suggested by Fornell and Larcker [11].

Our second measurement model treated OCB and ISS as second-order constructs, each was manifested by three dimensions. Previous research noted that a second-order approach provided a strong basis for capturing complex measures [34]. Also, this approach can explain more parsimoniously the covariation among first-order factors assessing the same theoretical construct, but the model with second-order factors usually cannot fit the data as well as the first-order model. Nevertheless, the goodness-of-fitness of our second-order four-factor model was close to the first measurement model which included all first-order constructs ( $\chi^2_{(411)} = 590.277$ ,  $p < 0.01$ ; GFI = 0.88; CFI = 0.98; IFI = 0.98; and RMSEA = 0.04). The paths from the second-order construct to the first-order factors were significant and greater than the suggested cutoff of 0.7 for OCB and ISS. Additionally, we followed the suggestion of Marsh and Hocevar [22] to assess the efficacy of second-order models by computing the Target coefficient  $\{T = \chi^2(\text{baseline model})/\chi^2(\text{alternative model})\}$ . The  $T$  coefficient, which has an upper bound of 1.0, indicates the extent to which the relationship among the first-order factors is captured by the higher-order factors. In our case, the target coefficient was 0.95, indicating that the variation of the measurement model was satisfactorily captured by the second measurement model which included two second-order (i.e., OCB and ISS) and two first-order constructs (i.e., EPM and IC). Thus, we treated the two higher-order constructs of OCB and ISS as second-order constructs in later analyses.

Subsequently, we examined the construct discriminant validity. First, we compared the square-root of AVE of the individual constructs with the correlation between construct-pairs. As shown in Table 3, the largest correlation was 0.74 between OCB and IC, which is smaller than the square-root of AVE of either OCB or IC (0.87 and 0.82, respectively). We found that the square-roots of AVE exceeded the correlations in all cases; this confirmed the discriminant validity for the scales. Second, we performed chi-square tests of differences for all the constructs in pairs to examine whether the restricted model was significantly different from the freely estimated model. In the restricted model, the correlation was fixed at 1 for the pair of constructs under examination. Table 4 shows that all differences are significant, providing additional support for the discriminant validity of the scales. These analyses indicated that the measurement model met various reliability and validity criteria. Thus, these constructs could be used to test the proposed model and the hypothesized relationships between constructs.

Finally, because we collected all the data from a single source, the users, our results might be vulnerable to common method variance. To address this, we followed the Harman's single-factor test procedure [29] and conducted a CFA by loading all indicators on one factor. The assumption of this single-factor test was that a single factor should account for the majority of the covariance among measures if substantial amount of common method variance was present [30]. We used CFA because it represented a more sophisticated approach. Our analysis showed that the one-factor model did not fit the data well (GFI = 0.53; CFI = 0.67; IFI = 0.68; and RMSEA = 0.15), while the four-factor model fit was significantly better ( $p < 0.001$ ). To further address the issue that common method variance may exist between OCB and EPM, we conducted a three-factor model by loading EPM and OCB indicators on one factor. Although the model fit improved (GFI = 0.674, CFI = 0.756, IFI = 0.717, RMSEA = 1.089), however, there was still significant difference between the three- and four-factor model ( $p < 0.001$ ). Both tests provided evidence that common method bias was not significant in our study.

#### 4.2. Hypotheses testing

We tested the proposed model by performing structural equation modeling with the maximum likelihood estimation method using AMOS 5.0 [2]. Given the limited sample size for assessing the model, we aggregated the OCB and ISS scales to have three indicators respectively by summing the measurement items at the first-order level. This was appropriate because the measurement validity of the two second-order factors had been verified. This reduced model complexity and the level of random error while accounting for measurement error and retaining the first-order dimensions. The paths from the second-order constructs to the first-order factors were set to  $\sigma^2 \times \alpha$ . The error variances of the first-order indicator were set to  $\sigma^2 \times (1 - \alpha)$ , whereas  $\sigma^2$  is the observed variance of the first-order variable and  $\alpha$  is its reliability.

We first evaluated the proposal model (Model 3 in Table 5) on various indices such as GFI, CFI, IFI, RMSEA, as well as adjusted GFI

**Table 4**  
Assessment of discriminant validity

Variable constrained	Chi-square statistic	Degrees of freedom	Chi-square difference <sup>a</sup>
None	590	411	
ISS with			
IC	659	412	69 <sup>***</sup>
EPM	624	412	33 <sup>***</sup>
OCB	659	412	69 <sup>***</sup>
OCB with			
IC	652	412	62 <sup>***</sup>
EPM	627	412	37 <sup>***</sup>
EPM with			
IC	626	412	36 <sup>***</sup>

<sup>a</sup> Difference between chi-square values of the variable and "None".

\*\*\* Significant at  $p < 0.001$ .

**Table 5**  
Structural equation modeling results

Attribute	Model 1: OCB → ISS direct effect only	Model 2: partially mediated	Model 3: fully mediated	Model 4: all direct effects
Standardized path estimates ( $\gamma$ )				
OCB → ISS	0.55***	-0.13	-	0.28***
OCB → IC	-	0.77***	0.77***	-
OCB → EPM	-	0.77***	0.77***	-
IC → ISS	-	0.37*	0.23*	0.31***
EPM → ISS	-	0.56***	0.52***	0.28***
Participation in IS implementation	0.02	0.04	0.04	0.05
Interaction with IS project team	-0.02	0.01	-0.01	-0.01
Experience of system use	0.09*	0.07 <sup>#</sup>	0.07 <sup>#</sup>	0.09 <sup>#</sup>
R <sup>2</sup> (IC)	-	0.60	0.60	-
R <sup>2</sup> (EPM)	-	0.59	0.59	-
R <sup>2</sup> (ISS)	0.30	0.47	0.47	0.26
Model fit indices				
$\chi^2$ (d.f.)	37 (20)	187 (111)	188 (112)	563 (113)
$\chi^2$ /(d.f.)	1.857	1.688	1.679	4.980
GFI	0.96	0.93	0.93	0.81
AGFI	0.83	0.89	0.89	0.72
CFI	0.98	0.98	0.98	0.86
IFI	0.97	0.98	0.98	0.86
RMSEA	0.08	0.06	0.05	0.13

<sup>#</sup> $p < 0.10$ ; \* $p < 0.05$ ; \*\*\* $p < 0.001$ ; - this variable is not included in the model.

(AGFI) [3]. Model 3 provided an appropriate fit to the data and the ratio of the chi-square value to the degrees of freedom was 1.68. The model was also assessed by  $R^2$  which indicated how well the antecedents explained an endogenous construct. Our Model 3 explained a substantial amount of variance for IC ( $R^2 = 0.60$ ), EPM ( $R^2 = 0.59$ ) and ISS ( $R^2 = 0.47$ ), which are greater than the recommended minimum of 0.10.

H<sub>1</sub> proposed that OCB would positively affect IC. Results in Table 5 provided support for this hypothesis ( $\gamma = 0.77$ ,  $p < 0.001$ ). H<sub>2</sub> posited that OCB would positively influence EPM, and the results also support this ( $\gamma = 0.77$ ,  $p < 0.001$ ). H<sub>3</sub> and H<sub>4</sub> proposed that IC and EPM would positively affect ISS. The results supported the hypotheses, whereas the influence of EPM on ISS ( $\gamma = 0.52$ ) was relatively greater than IC ( $\gamma = 0.23$ ).

H<sub>5</sub> posited that IC and EPM would mediate the influence of OCB on ISS. To test this hypothesis, we followed the procedure suggested by Baron and Kenny [4] and evaluated three models. The first contained only OCB and ISS without any mediating variables, while the second allowed the partial mediation of EPM and IC (and direct effects for OCB). The third was our proposed model: it allowed full mediation of EPM and IC. The three items assessing user participation and experience of system use were also included as control variables in all models.

For Model 1, OCB positively influenced ISS. The results regarding H<sub>1</sub>–H<sub>4</sub> indicated that OCB was an independent variable significantly influencing the mediators (EPM and IC) and the mediators significantly influenced the dependent variable (ISS). Finally, a comparison of the direct effect of OCB on ISS between Models 1 and 2 revealed that the path coefficient of OCB dropped from 0.55 in Model 1 ( $p < 0.001$ ) to -0.13 in Model 2 ( $p > 0.1$ ) when the mediators were introduced into the model, revealing that IC and EPM fully mediated the influence of OCB. The results satisfied the conditions suggested by Baron and Kenny and supported H<sub>5</sub> for the mediation.

#### 4.3. Comparison with alternative models

Model 3 proposed a fully mediated model for the effect of OCB on ISS, which was supported by our data. This model represents one of several possible ways in which the relationships between the constructs could be configured. Alternative models could also

provide plausible predictions and explanations about the influences of OCB, IC, and EPM on ISS. Specifically, OCB could affect ISS directly and through the mediation of IC and EPM (i.e., Model 2). On the other hand, OCB, IC, and EPM could have direct impacts on ISS without any mediation (i.e., Model 4). To explore these possibilities, we compared Model 3 with two alternative models, Models 2 and 4, on the following criteria: (1) the same model fit indices used to assess the research model; (2) the explanatory power of the predictive variables on the outcome variables, as measured by the  $R^2$  of the outcome variables; (3) the percentage of the model's hypothesized parameters that are statistically significant. Model 3 was better than Models 2 and 4 on all indices, but only minor differences existed between Model 2 and Model 3. With regard to the explanatory power, Model 2 explained the same percentage of variance (47%) as Model 3. Model 4 explained only 26.3% of the variance of ISS. All of the hypothesized parameters were significant in Models 3 and 4 because all hypothesized paths received empirical support, whereas only four out of five hypothesized paths were significant for Model 2.

Our results suggested that the full mediation model was relatively better. Since the direct influence of OCB was not confirmed in Model 2 and the model fit indices were lower in Model 4, we conclude that Model 3 would be a better representation of the relationships among the constructs due to its parsimony and good model fit.

## 5. Discussion

Our combination of two frameworks provided support for the theory that OCB are significant predictors of ISS, but primarily through their impact on the creation of an integration climate and EPM. Both mediators have significant influence on ISS, and the measure of OCB can predict these mediators. In addition, our model was the best fitting one, providing support for the combined framework. Our data clearly supported the predictions of Niehoff's organizational effectiveness mediated model. Aggregated OCB do not directly influence effectiveness, but do so indirectly by promoting socio-emotional support and facilitating the accomplishment of work. Our results also provided empirical support for a significant link between OCB and effectiveness.

The study placed emphasis on the behavior of members of an implementation team who go above and beyond their task requirements. These behaviors create an integration climate for the implementation and engender effective management of it. Our results clearly suggest that OCB can predict ISS through the mediation of IC and EPM. Moreover, they show EPM to be a more important mediator than integration climate in the OCB–ISS relationship.

It should be noted that our study focused on the influence of OCB on ISS implementations. This is not to suggest that OCB would be the only influence on success, as our model does not include all possible factors that could influence it. Factors such as the talents and abilities of the team, abilities of the employees, their readiness for change, and user-friendliness of the new system would influence successful implementation. Future research may expand and integrate more relevant factors into the model.

## 6. Managerial implications

Based on the findings, three implications can be drawn. First, the cooperative and helping behavior of the implementation team has a very significant impact on ISS. The OCB level of the implementation team elicits more positive perceptions in the minds of the users, particularly in their judgment of the information quality, system quality, and individual impact of the system. Thus training of implementation team members should include a focus on human skills and projecting an attitude of helpfulness. Thus, managers also need to observe the implementation process and listen to users directly involved in the implementation. If warning signs begin to emerge in the form of low levels of OCB, corrective actions should be taken.

Second, OCB influence not only the integration climate, but also good project management. As people go above and beyond their job descriptions, projects can be managed more effectively. When a cooperative spirit is embodied in the implementation team, it spreads to users so that all are more willing and ready to contribute to project success. When all employees demonstrate high levels of OCB, an organization can truly establish a culture of total quality management, which is an important antecedent of ISS [21].

Third, the OCB of the implementation team had no direct effects on ISS, but it helped by establishing an integration climate and improving project management.

Finally, given the positive impact of OCB, it is important to understand how a manager can influence behavior. Managers can have an impact on OCB through their day-to-day treatment of employees. Creating fair reward systems, making decisions using fair and transparent procedures, and generating trust in the workplace go a long way in developing a culture of OCB among employees.

## 7. Conclusions

Prior research has not seriously studied the effect of OCB on ISS, nor has the implementation team's voluntary and discretionary exhibition of behaviors been considered. Our study has provided evidence to show the organizational consequences of OCB in IS implementation. The findings suggest no direct effect of OCB on ISS, but indirect effects through integration climate and EPM.

For years, IS managers have been alerted to the importance of the social interaction between the implementation team and its users. However, little has been said about the importance of voluntary behaviors in the implementation team. Our study revealed that IS and user managers should consider reinforcing organizational practices that nurture such behavior.

## 8. Limitations

While our study provided a useful starting point for investigating the OCB–ISS relationship, it has limitations. First, in describing the relationship between the implementation team's OCB and ISS, there may be other mediating constructs, such as the capacity for solving problems and adaptability to organizational change induced by implementing a new system. Second, the findings may be susceptible to the influence of culture difference, thus generalizing findings to other cultures should be made cautiously. Second, our study focused on the users' perspective in assessing the impact of group-level OCB on ISS. To address this perspective, the relationships between constructs were analyzed at the individual instead of the organizational level. However, it seems more sensible if ISS is conceptualized to reflect the impact of IS on the organization. In such a model, the antecedents of ISS are at multiple levels (group and individual).

Finally, all the data in our study were collected from the same users and the findings might be subject to common method bias [29]. For instance, by asking employees to assess the OCB of project team and the effectiveness of project management, those employees who had good rapport with the project team might judge them positively in other aspects, such as project management. Although we used single-factor and three-factor tests to show that one single factor or loading OCB and EPM on one factor could not account for more variance in the data than the four-factor model, it could not eliminate the threat of method bias.

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