



The combined effects of managerial control, resource commitment, and top management support on the successful delivery of information systems projects

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Abstract

Current research on information systems (IS) projects fails to comprehensively explain how these projects can achieve higher performance. This study examines the underlying conditions that result in IS project performance. We examined the role of managerial control as well as the moderating effects of resource commitment and top management support. Data were collected from 262 respondents working in various IS projects across Pakistan. The results indicate that managerial control plays a key role in the performance of IS projects. The moderating role of resource commitment was established for clan control and outcome control, while it failed to play a moderating role for behavioral control and self-control. In case of top management support, the moderation was established for outcome control and clan control while for other two dimensions of managerial control i.e. self-control and behavioral control, the moderating role was not established.

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1. Introduction

In recent years, there has been extensive research on information systems (IS) projects and the role of formal and informal control systems in the efficient management of IS projects (Tiwana, 2010; Cram and Brohman, 2013; Gregory et al., 2013). Despite widespread research interest in studying these two constructs, there are few studies (e.g. see Rauniar and Rawski, 2012; Marnewick, 2016; Berssaneti and Carvalho, 2015; Coombs,

2015) linking managerial control and IS project performance. This omission is serious because managerial control is considered key to project performance (Yang & Fam, 2009), and managerial control by the project manager ensures that desired standards of professionalism (Beringer, Jonas & Kock, 2013; Huang et al., 2014) and goal oriented performance are maintained within a project (Henderson and Lee, 1992; Kirsch, 1997).

The project manager is expected to reinforce common values among project employees through intrinsic motivation and self-control (Andersen and Chen, 2002; Neal et al., 2013; Huang et al., 2014) as a way of enhancing project performance (Chua et al., 2012). Therefore, it is important to know whether managerial control is a determinant of project performance. The first objective of this study is to fill this research gap. This topic is important to investigate because clients want effective control through their liaison with project teams, so it represents a way of improving project performance (Liu and Deng, 2014). The project

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can become more efficient and effective if client and vendor are able to establish proper components of informal control (Soh et al., 2011; Heumann&Mähring, 2015). While this relationship exists in every type of project, its implications for information systems (IS) projects are more prominent since these projects require more control (Aubry, 2015).

We posit that managerial control and its constituent components, which include behavior, outcome control, clan and self-control (Kirsch et al., 2002; Kirsch, 1997) can be applied to the operational structure of IS projects to generate creativity and discipline in the complex operations of these projects (Nidumolu and Subramani, 2003; Rustagi et al., 2008). An important objective of this study is to clarify the relationship between managerial control and project performance (Liu and Wang, 2016) as well as the moderating effects of resource commitment (Mao et al., 2016) and top management support (Ahmed et al., 2016), since the literature suggests that resource commitment and top management support are important for different phases of projects (Richey et al., 2014; Swink, 2000; Young and Jordan, 2008; Dong et al., 2009; Hermano and Martín-Cruz, 2016). However limited theoretical perspective exists in the literature as of yet that clarifies the relationships among these constructs within the field of IS projects, specifically (Hsu et al., 2011; Liu and Wang, 2016).

Since major work on managerial control addresses various contexts (Keil et al., 2013), the present research contributes to the project management literature in three ways. First, we examine the role of managerial control on project performance satisfaction, which has been widely neglected in existing research. Second, we explore the moderating effect of management support and resource commitment, thereby enriching existing knowledge of IS projects. Third, the vast majority of the IS project literature addresses developed country contexts, with the theoretical and practical implications of IS projects in developing countries like Pakistan having largely been ignored thus far. This study thus moves the field forward by analyzing IS projects in a non-US/Western context.

2. Theory and hypotheses

2.1. Managerial control and information systems projects

Effective managerial control results in favorable project outcomes (Henderson and Lee, 1992; Jackson et al., 1997) because it allows a team to combine their efforts in project operations (Piccoli and Ives, 2003). The four components of managerial control as defined in the extant literature are behavior control, outcome control, clan control and self-control (Kirsch et al., 2002; Kirsch, 1997). Studies suggest that behavior control and outcome control significantly interact with vendor performance in information systems projects (Srivastava and Teo, 2012; Liu and Wang, 2014). Informal control, clan control and self-control have also been observed to affect outcomes (Keil et al., 2013; Henry et al., 2015). In addition, basic common acquaintance specifically in IS projects (Tesch et al., 2009). Studies such as the one by Di Tullio and Staples (2013) suggest that the four components of managerial control are imperative for IS project performance. These

findings provide us with some direction for our first set of hypotheses, which suggest that.

H1a. Behavior control is positively associated with IS project performance.

H1b. Outcome control is positively associated with IS project performance.

H1c. Clan control is positively associated with IS project performance.

H1d. Self-control is positively associated with IS project performance.

2.2. The moderating role of resource commitment

Resources of various kinds can contribute to project performance. Studies suggest that the utilization of resources under optimal control mechanisms contributes to the ultimate performance of an entity (Snell, 1992). Under these conditions, resource commitment can be considered as a force that monitors resource distribution, ensuring the proper utilization of resources for optimal performance (Ulmer, 2000; Ripollés et al., 2012). In a recent study, Richey et al. (2014) argued that firms cannot maintain high levels of performance without a steady flow of resources. Resource commitment has a profound impact on performance (Li et al., 2011).

Due to the significance of resource commitment for the performance of an entity in general, we argue that it should also be significant for IS projects. When managerial control is applied at the same time that optimal resource commitment is ensured, the combined effect of both should enhance the performance of IS projects. Conversely, a low level of resource commitment can adversely affect project performance. This leads us to our next set of hypotheses, which suggest that:

H2a. Resource commitment moderates the relation between behavior control and the performance of IS projects, such that higher resource commitment strengthens the relationship.

H2b. Resource commitment moderates the relation between outcome control and the performance of IS projects, such that higher resource commitment strengthens the relationship.

H3c. Resource commitment moderates the relation between clan control and the performance of IS a project, such that higher resource commitment strengthens the relationship.

H4d. Resource commitment moderates the relation between self-control and the performance of IS projects, such that higher resource commitment strengthens the relationship.

2.3. The moderating role of top management support

The other factor we considering the present study is the potential moderating role of top management support on the relationship between managerial control and project performance. A plethora of literature supports a significant association between top management support and IS project performance

(e.g., see Thong et al., 1996). Drawing on the tenets of social learning theory (Bandura, 1969), the behavior patterns adopted by top management have been found to affect subordinate employees' behavior (Foshee and Bauman, 1992). Thus, in IS projects in which employees feel that they receive support from top management, they tend to exert more effort on successful project execution (Bonner et al., 2002; De Bakker et al., 2010)

Project-based organizations, like all other organizations, are experiencing a turbulent period, and employees working in these organizations encounter workplace hassles and stress as a matter of routine. Under these conditions, we argue that managerial control coupled with top management support should have a positive effect on IS project performance. This proposition forms the basis for our next set of hypotheses, which consist of the following statements:

H3a. Top management support moderates the relation between behavior control and the performance of IS projects, such that higher management support strengthens the relationship.

H3b. Top management support moderates the relation between outcome control and the performance of IS projects, such that higher management support strengthens the relationship.

H3c. Top management support moderates the relation between clan control and the performance of IS projects, such that higher management support strengthens the relationship.

H3d. Top management support moderates the relation between self-control and the performance of IS projects, such that higher management support strengthens the relationship.

Fig. 1 shows theoretical relationship between variables:

3. Research methodology

3.1. Sampling and procedure

Various types of projects are currently operating in Pakistan, but for present study we focused on IS projects located in various cities across Pakistan. These projects are managed from IT hubs and software parks in Pakistan's major cities. To ensure that variety of IS projects were represented in the study, the authors collected data from different cities and different types of IS projects.

The target sample encompassed project managers and team members who filled out the questionnaires. The first author personally visited the projects under investigation and obtained

the respondents' consent. >300 questionnaires were distributed at 15 different projects in October 2016. Follow-up data collection occurred three months later, in January 2017. The response rate was quite encouraging, with a total of 262 useable questionnaires returned. The 87% response rate might seem high, but in a country like Pakistan, if you have good contacts and personal references, this response rate is not unusual.

The respondents were 79% male and 21% female. This is representative of the population under investigation to a large extent, as the presence of women in IS projects in Pakistan is quite low. The majority of the sample fell within the ages of 34–41 years old and had an average job tenure of 5–10 years. The questionnaire used a 5-point Likert scale for data collection, with 1 representing "strongly disagree" and 5 representing "strongly agree."

A 14-item scale developed by Kirsch et al. (2002) was used to measure the four dimensions of managerial control, i.e. behavior control, outcome control, clan control and self-control. Cronbach's alpha for these dimensions were 0.80, 0.81, 0.73 and 0.83, respectively. Project performance was measured using a 6-items scale developed by Wallace et al. (2004), with an alpha reliability of 0.85. Resource commitment was measured with a 3-item scale developed by Lai et al. (2008) with an alpha reliability of 0.851, and top management support was measured using a 6-item scale developed by Ahmed et al. (2016) with an alpha reliability of 0.862. Based on evidence in extant literature age, gender, education of the respondents has been taken as control variables.

4. Results

4.1. Correlations

Table 1 presents the correlations between different variables.

Table 1 indicates that the dimensions of managerial control are strongly associated with project performance. Outcome control has the strongest association ($r = 0.477^{**}$, $**p \leq 0.001$) with project performance, followed by behavioral control ($r = 0.419^{**}$, $**p \leq 0.001$), clan control ($r = 0.383^{**}$, $**p \leq 0.001$) and self-control ($r = 0.304^{**}$, $**p \leq 0.001$).

4.2. Regression analyses

The Table 2 above shows the regression analyses between independent and dependent variables. The regression had an R^2 value of 0.32, indicating that 32% of the variation in project

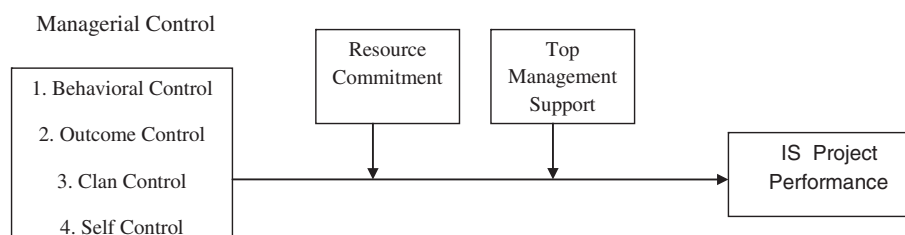


Fig. 1. Theoretical Framework.

Table 1
Means, standard deviations, correlations, and reliabilities (in parentheses).

Variables	Mean	SD	1	2	3	4	5	6	7
1.Behavioral control	3.19	0.87	(0.80)						
2.Outcome control	3.68	0.89	0.37	(0.81)					
3.Clan control	3.10	0.84	0.29	0.439 **	(0.73)				
4.Self control	3.22	0.95	0.255	0.224	0.301	(0.83)			
5.Resource commitment	3.54	0.82	0.260	0.499 **	0.398 **	0.181	(0.85)		
6.Top management support	3.59	0.78	0.385	0.543 **	0.317 **	0.162	0.656 **	(0.86)	
7.Project performance	3.67	0.81	0.419 **	0.477 **	0.383 **	0.304 **	0.481 **	0.571 **	(0.85)

** $p \leq 0.01, p \leq 0.05$.

control is explained by the dimensions of managerial control. In terms of individual dimensions, we can see that outcome control emerges as the main predictor of project performance, with a beta value of 0.28. The other dimensions behavioral control, clan control and self-control have relatively lower beta values, i.e. 0.17, 0.15 and 0.11 respectively.

4.3. Moderated regression analysis

We used Baron and Kenny’s (1986) method of creating an interaction term to determine the results of the moderation. Tables 3 and 4 shows the results of the moderated regression analysis.

Table 3 shows that including the interaction terms verifies the moderating role of resource commitment on various dimensions of managerial control. The results indicate that resource commitment does not moderate the relationship between behavioral control and outcome control due to very weak beta values of 0.044 and 0.040 respectively. However, we see a significant beta value for the interaction terms between resource commitment and clan control (0.188**, ** $p \leq 0.01$) as well as self-control (0.366**, ** $p \leq 0.01$). Based on these findings, we accept these hypotheses.

Table 4 shows the moderating role of top management support on project performance. We were able to establish a moderating role for outcome control ($\beta = 0.20$ **, ** $p \leq 0.01$) and clan control ($\beta = 0.12$ **, ** $p \leq 0.01$); however, insignificant beta values for self-control (0.036) and behavioral control (0.009) guided us to reject these hypotheses.

Table 2
Regression analysis for outcomes.

Predictors	Project performance		
	β	R ²	ΔR^2
<i>Step 1</i>			
Control variables		0.039	
<i>Step 2</i>			
Behavioral control	0.17**		
Outcome control	0.28**		
Clan control	0.15**		
Self-control	0.11**	0.359**	0.32**

$n = 262; * p < 0.05; ** p < 0.01; *** p < 0.001$.

5. Discussion

In the present study, we tested a model intended to explain the role of managerial control in determining the performance of IS projects. Theoretically, our study advances the literature on IS projects by suggesting that the four dimensions of managerial control are essential predictors of IS project performance, findings that are in line with Henry et al. (2015). Several key findings emerged that are important for theory, research, and practice. In addition to the direct relationship between dimensions of managerial control and IS project performance, this study suggests that resource commitment and top management support play a moderating role in some relationships, which is a unique finding of the our study and has never before been tested in the project management literature.

The relationship between managerial control and project performance was positive for all four dimensions of managerial control, namely behavioral control, outcome control, clan control and self-control. However, the results suggest that the relationship was strongest for outcome control, followed by behavioral control. These results contribute to our theoretical understanding of IS projects and the role of behavioral control specifically, suggesting that higher levels of behavioral control exercised by managers increase team members’ motivation, which is an important component of high performance in IS projects. Thus, our study advances the field by revealing that the effect of behavioral control on IS project performance is

Table 3
Results of moderated regression analysis for resource commitment.

Predictors	Project performance		
	β	R ²	ΔR^2
<i>Step 1</i>			
Control variables		0.039	
<i>Step 2</i>			
Behavioral control	0.162**		
Outcome control	0.185**		
Clan control	0.106		
Self-control	0.106**		
Resource commitment	0.273**	0.391**	0.373**
<i>Step 3</i>			
Behavioral control \times resource commitment	0.044		
Outcome Control \times resource commitment	0.040		
Clan control \times resource commitment	0.188**		
Self control \times resource commitment	0.366**	0.507**	0.116**

Table 4
Results of moderated regression analysis for top management support.

Predictors	Project performance		
	β	R ²	ΔR^2
<i>Moderator: top management support</i>			
Step 1			
Control variables	0.039 ^a		
Step 2			
Behavioral control	0.112 **		
Outcome control	0.135 **		
Clan control	0.129 *		
Self-control	0.116 **		
Top management support	0.384 **	0.449 **	0.410 **
Step 3			
Behavioral control × top management support	0.009		
Outcome control × top management support	0.200 **		
Clan control × top management support	0.123 **		
Self-control × top management support	0.036 ***	0.568 **	0.119 **

^a $n = 262$.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

situational and related to the degree to which managers provide help and share knowledge. Since IS projects require more detailed attention and help from project managers, behavioral control is key to the performance of these projects. While the other dimensions also have a positive link with IS project performance, their beta values are rather low.

Our findings suggest that outcome control, clan control and self-control can have important consequences for IS project success. Each of the examined dimensions of managerial control had a unique impact on the outcome variable. Our findings are consistent with previous studies, which also found that these dimensions have unique relationships with IS project performance (e.g., see Liu and Wang, 2016). Management needs to think carefully about how to exercise these types of managerial control, as psychologically empowered staff are vital for performance, but work patterns in IS projects are a bit different. Managers have to provide workers with autonomy through the exercise of outcome, clan and self-control. Regarding clan control, we find further support for the findings of Keil et al. (2013) and Wiener et al. (2015), who suggested that clan control has a positive association with project performance. Outcome control helps teams focusing desired outcomes and thus meet customer expectations. If this dimension is deployed successfully, our study's findings suggest that high performance on IS projects can be ensured.

In general, we found good support for our hypotheses, but few of our hypotheses on the moderating role of resource commitment and top management support were accepted. We feel that the rejection of our hypotheses that resource commitment moderates the relationship between IS project performance and behavioral control and outcome control can be attributed to a number of reasons. As Li et al. (2011) suggest that resource commitment is not an important predictor of performance, we advance the IS project literature by suggesting that behavioral control is not influenced by resource commitment. This is an important finding highlighting the role of

psychological factors in IS project success, and indicates that if managers exercise behavioral control, project performance can improve even if resources are not available in abundance. Similarly, when managers have effective outcome control, our findings suggest that resource commitment has little to do with performance. In other words, more resources cannot ensure higher IS project performance until and unless managers are able to exercise outcome control. These findings do not undermine the importance of resources, but suggest that IS projects need to focus on psychological factors more than material resources.

Similarly, our two hypotheses regarding the moderating role of top management support in the relationship between behavioral control, self-control and IS project performance were not supported. These findings were a bit surprising, as top management support should have strengthened the relationships. We argue that self and behavioral control by the project manager represents a form of direct support to IS project employees, with top management support playing only a secondary role in this situation, and that this is the reason why the interaction effect was not found to be very important. Such issues have never been highlighted in the extant IS project literature, and provide further evidence for how psychological factors are crucial for the success of these projects.

6. Practical implications

Our findings are practically relevant because the direct relationship between managerial control and IS project performance is important for both researchers and practitioners. The implementation of information systems projects is complex by nature, and managerial control can contribute to enhanced performance (Kirsch et al., 2002). Our findings illustrate the indirect importance of empowering leadership and the direct impact on IS project performance. Although IS projects are unique in that they focus primarily on technology, our study highlights the critical importance of behavioral issues for practitioners. Our study indicates that an empowering leader is an important facilitator of project success and directly affects project performance. Thus, organizations may find it useful to emphasize that project managers exhibit adequate managerial control in order to ensure the success of IS projects. However, this might be challenging for both managers and organizations, as the transition from traditional forms of IS project managerial control to a system based on behavioral, clan, outcome and self-control involves several challenges. Moreover, such managerial styles may not suit some IS projects, with contextual factors like the rigid bureaucratic structures in developed countries likely to play a critical role. Hence, implementation needs to be approached cautiously at all levels.

7. Limitations and future research directions

The results are limited by our study's cross-sectional design and by the use of a single method of data collection. The fact that data were collected from IS projects only limits its generalizability, and future studies should also consider other types of project-based organizations when studying the impact

of managerial control. We did not study the role of culture as a moderating variable. However, we believe that cultural variation can affect IS project performance, and future studies should consider this aspect as well. Another possible area of research can be to study the underlying mechanisms between managerial control and project performance in the form of mediators.

Conflict of Interest

The authors of the paper certify that they have no conflict of interest of any kind.

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