Control-Style Ambidexterity and Information Systems Project Performance: An Expanded View of Control Activities

Abstract

Information systems (IS) projects represent key building blocks of large-scale digital transformation initiatives. As a result, IS projects have become increasingly ambitious in terms of both goals and scale, making it even more challenging for managers to exercise control over such projects. While prior research primarily focused on the direct and interactive effects of formal and informal control modes on IS project performance, recent research directs attention to the importance of considering project managers' control styles (i.e., how managers interact with controlees to enact controls). Corresponding studies also indicate that 'either/or' control approaches—as opposed to 'both/and' approaches—seem no longer viable in today's complex environment. Drawing on a control ambidexterity perspective, the study at hand theoretically develops and empirically tests the direct and interactive effects of control-style ambidexterity on IS project performance. Using matched-pair data from 146 IS projects (from 146 high-tech firms), we find that control-style ambidexterity improves project performance—directly and in combination with both formal and informal control. Our study contributes to developing a more comprehensive understanding of effective IS project control tactics, which can help explain mixed findings in prior literature and thus support continued theory development in the research area.

Keywords: IS project control, control-style ambidexterity, control-mode ambidexterity, IS project performance, matched-pair survey.

1 INTRODUCTION

Across industries, digital transformation and innovation represent top priorities for many companies. For example, global investments in digital technologies were projected to total $3.8 trillion in 2019, an increase of 3.2 percent from 2018 (Gartner, 2018). The focus on digital transformation and innovation has also raised new challenges and complexities for the successful management of IS projects (Gregory, Keil, Muntermann, & Mähring, 2015), which represent key building blocks of corresponding programs and thus continue to be a prime concern for IS researchers and practitioners (Wiener, Mähring, Remus, Saunders, & Cram, 2019). Drawing on organizational control theory (e.g., Ouchi, 1997), research on IS projects has recognized that exercising control is a valuable 'tool' to increase the likelihood of project success (i.e., Gregory et al., 2015; Kirsch, 1997, 2002; Wiener et al., 2019). In the IS project control literature, control is typically defined as any attempt by a project manager (controller) to align the behaviors of project team members (controlees) with organizational objectives (Choudhury & Sabherwal, 2003; Gregory, Beck, & Keil, 2013; Kirsch, 1996, 1997; Liu, 2015; Tiwana, 2010; Wiener, Mahring, Remus, & Saunders, 2016).

The current trend toward digital transformation and innovation has led to a progressive shift in general approaches to and focal outcomes of IS projects (Wiener et al., 2019), including a shift from specifying predefined end states to engaging in open-ended experimentation (Lanzolla et al. 2018); from delivering commodity services to driving platform innovation (Gregory et al., 2018); and from efficiency to agility in IS projects (Conboy, 2009). The coexistence of different and often competing demands challenges the effectiveness of 'simple' control tactics in IS projects (Gregory et al., 2013), and in particular the effectiveness of 'either/or' approaches, as opposed to 'both/and' approaches (Lewis et al., 2002). As such, it seems little surprising that existing IS project control studies revealed partly inconclusive, and sometimes contradictory, findings with regard to the isolated effects of different control tactics on the performance of IS projects (Remus et al., 2020), pointing to the need for further refining our understanding of what constitutes effective IS project control approaches (Wiener et al., 2016; Wiener et al., 2019). In this regard, despite recent conceptual and theoretical advances, two research gaps and shortcomings in prior literature are particularly noteworthy.

First, earlier research on IS project control has been characterized by a strong focus on only one dimension of control activities, namely, on the configuration of control portfolios (i.e., '*what*' control modes are used), as opposed to '*how*' the controller interacts with the controlee to enact selected controls (Wiener et al., 2016). For example, while existing research widely agrees on the antecedents of control-mode choices, it stops short of explaining how selected controls are put into practice. Notable exceptions are, for example, the studies by Gregory and Keil (2014), Remus et al. (2020), and Wiener et al. (2016), which direct research attention to the importance of considering the control styles used by project managers. In fact, empirical evidence suggests that the controller's control style (*how*) is more important than the exercised control modes (*what*) (Remus et al., 2020), yet the former remains relatively unexplored.

Second and relatedly, existing research has largely focused on simplistic direct effects between control modes and IS project performance (Gopal & Gosain, 2010; Keil, Rai, & Liu, 2013; Tiwana & Keil, 2009), thereby neglecting the interactive effects between basic control styles ('both/and' approach), as well as between such styles and different types of control modes (Remus et al., 2020). Investigating these interactive effects is important, since, when exercising control, a controller needs to decide what control mechanisms (modes) to use and how to enact them (styles) (Wiener et al., 2016). While existing studies do look into control-mode interactions (e.g., Chua et al., 2012; Tiwana 2010), our understanding of control-style interactions and how styles interact with formal and informal control modes has so far received only very little research attention (Gregory et al., 2014; Remus et al., 2020).

To address the gaps and shortcomings highlighted above, our study draws on the work by Gregory and Keil (2014) on control ambidexterity, which suggests that the combination of contrasting control tactics can attenuate negative impacts of individual tactics and may strengthen control effectiveness through synergistic effects. In an effort to expand Gregory and Keil's (2014) work, the focus of our study lies on control-style ambidexterity (i.e., the combination and simultaneous use of different control styles). This can be explained by the fact that, at least implicitly, the notion of control-mode ambidexterity (i.e., the combination of formal and informal control modes into a control portfolio) has already received significant attention in extant IS project control studies (e.g., Choudhury & Sabherwal, 2003; Chua et al., 2012; Gregory & Keil, 2014; Kirsch, 1997; Wiener et al. 2016). These studies highlight the necessity and superior effectiveness of control portfolios that combine formal and informal controls, thereby supporting the notion of control-mode ambidexterity. In contrast, the notion of control-style ambidexterity, as well as the interplay between control styles and modes, remain underexplored (e.g., Remus et al., 2020). As such, the study at hand sets forth to explore whether control-style ambidexterity represents a viable and effective control strategy for a single IS project manager, as opposed to a tandem of IS project managers (Gregory & Keil 2014). Specifically, our study addresses two research questions: (1) *How does control-style ambidexterity relate to IS project performance?* (2) *How do different control types (i.e., formal and informal control) interact with control-style ambidexterity to influence IS project performance?*

To answer our research questions, we draw on existing literature to develop alternative hypotheses for both questions and rely on matched-pair data from 146 IS projects (conducted in 146 UK-based high-tech firms) to test our hypotheses. The use of matched-pair data covering both sides of the control dyad (i.e., the controller and controlee side) allows us to evade a key methodological shortcoming of prior survey-based IS project control studies, which tend to rely on data from only one side of the control dyad and thus build on the implicit assumption of control congruence between controller and controlee (Wiener et al., 2016).

By shedding light on the direct and interactive performance effects of control-style ambidexterity, the empirical insights gained from our study contribute to a more comprehensive understanding of effective IS project control tactics. Such an understanding can help explain mixed findings regarding control effects on IS project performance in prior research, thereby facilitating continued theory development in the research area. The remainder of this article is structured as follows: in the next section, we introduce focal study constructs and review related literature. We then develop our (alternative) research hypotheses and describe our research methodology. Next, the hypothesis test results, along with additional analyses, are presented. We conclude by discussing our findings as well as their implications for both research and practice.

2 THEORETICAL BACKGROUND

2.1 IS project control

Drawing on organizational control theory (e.g., Ouchi, 1979), IS project control studies typically define control in a behavioral sense and emphasize that control activities are required to ensure that the actions of IS project team members are aligned with project goals and objectives (Kirsch, 1997). In this behavioral view of control, a typical control situation is seen to be dyadic, involving a controller (e.g., an IS project manager) who exercises control over a controlee, or a group of controlees (e.g., project team members) (Choudhury & Sabherwal, 2003; Liu, 2015).

The traditional and most commonly used framework, or typology, conceptualizes control activities in terms of five control modes (input, behavior, and outcome control, as well as clan and self-control) that are classified into two basic control types: formal and informal control (e.g., Choudhury & Sabherwal, 2003; Kirsch, 1996; Wiener et al., 2016). Formal control is used to specify resource allocations (input), standard procedures and processes (behavior), and desired outcomes (Choudhury & Sabherwal, 2003; Kirsch, 1997). In contrast, informal control focuses on social strategies to influence controlee behavior (Choudhury & Sabherwal, 2003; Kirsch, 1997). For instance, clan control relies on the promulgation and establishment of norms and values that are shared by the project manager and project team members in an attempt to enforce commonly accepted behaviors and align controlee behaviors with organizational objectives (Kirsch, 1996; Wiener et al., 2016).

While viewing control activities through the lens of control modes/types has provided valuable insights into the control tactics used in IS projects, this traditional view seems to consider only one dimension of control activities and thus to neglect the multidimensionality of such activities (e.g., Gregory et al., 2013). In this context, Wiener et al. (2016) draw on a comprehensive literature review to propose an expanded IS project control framework, which centers around the conceptual distinction between control configuration (i.e., *what* control modes constitute the portfolio) and control enactment (i.e., *how* the controller interacts with controlees to implement formal control and/or promote informal control). With reference to these two key dimensions of control activities, they argue that while "the configuration of the control portfolio is certainly a key control activity, […] it is control enactment (*how*) that ultimately determines control consequences" (Wiener et al., 2016, p. 755). Their argument finds empirical support in recent studies, which demonstrate that control enactment (in terms of control styles) is more important than control configuration (in terms of control modes) in explaining the performance effects of control activities (Liu & Chua, 2020; Remus et al., 2020).

As indicated above, existing studies conceptualize control enactment in terms of control styles (ibid), defined as "the manner in which the interaction between the controller and the controlee is conducted" (Wiener et al., 2016, p. 755). In this regard, Wiener et al. (2016) distinguish between two basic control styles (authoritative versus enabling) and point to two key features (repair and transparency) that distinguish an enabling control style from an authoritative one. Specifically, the repair feature concerns the anticipation of breakdowns in control activities and the provision of capabilities for fixing them (including the appreciation of controlee feedback on real work contingencies), whereas the transparency feature "is concerned with the visibility of control activities and the overall project context" (p. 756). In this study, we focus in on one of these two features (*repair*) and use this feature to distinguish between a directive and a participative control style.[1] A *directive* control style represents a bureaucratic approach to enacting controls (Gregory & Keil, 2014), which aims to minimize the level of interaction between controller and controlees (Wiener et al., 2016). It ensures compliant controlee behavior and goal-directed effort by relying on formal authority and allows controlees little or no influence over how control is enacted (ibid). In contrast, a *participative* control style represents a collaborative approach to control enactment (Gregory & Keil, 2014). It relies on frequent controller-controlee interactions and encourages controlees to give feedback to the controller, thereby empowering project members to actively participate in control processes (Wiener et al., 2016). A summary of the expanded view of control activities (including the definition of key concepts) adopted in this study is provided in Table 1.

[1] Given our study's exclusive focus on the repair feature, we decided to use different labels for the two contrasting control styles in order to avoid any confusion with the more comprehensive control style conceptualizations used in Wiener et al. (2016; see also Remus et al., 2020).

Table 1. Expanded view of IS project control activities (based on Wiener et al., 2016)

Concept	Definition	Conceptualization
Control configuration in terms of control **modes** (*what*)	The selection of control mechanisms/modes that constitute the control portfolio (e.g., Choudhury & Sabherwal, 2003; Kirsch, 1997)	*Formal* control modes (input, behavior, and outcome control) *Informal* control modes (clan and self-control)
Control enactment in terms of control **styles** (*how*)	The interaction between controller and controlee through which the controller implements formal controls and/or promotes informal controls (Gregory & Keil, 2014; Wiener et al., 2016)	*Directive* control style (bureaucratic style characterized by lack of repair and limited controller-controlee interaction) *Participative* control style (collaborative style characterized by repair and frequent controller-controlee interaction)

An important conceptual assumption with regard to the above-introduced expanded IS project control framework is that control styles are different from leadership styles. In particular, the framework is based on the assumption that the adoption of a particular control style (or combination thereof) represents a manager's deliberate decision to enact controls in a certain manner and that this decision depends on contextual and situational requirements (Wiener et al., 2016; cf. Lewis et al., 2002). On the other hand, a manager's leadership style is often thought to be tied to personality traits and/or capability levels (e.g., Cable & Judge, 2003; Simic et al., 2017), and thus does not represent a deliberate decision.[2] This also implies that a manager may decide to use different control styles simultaneously (referred to as control-style ambidexterity in the following—see section 2.3 below), whereas a manager can be expected to have only one 'dominant' leadership style. As well, in line with earlier IS project control studies (Remus et al., 2020; Wiener et al., 2016), our study builds on the conceptual assumption that both a directive and a participative control style can be used to enact both formal control and informal control.

2.2 Review of related literature

In general, previous literature has recognized that exercising control is a valuable 'tool' to improve the performance of IS projects (Kirsch, 1997) and in particular to achieve higher project quality and efficiency (Keil et al., 2013). Here, numerous studies provide empirical evidence on the direct effects of different control modes on IS project performance (e.g., Gopal & Gosain, 2010; Liu et al., 2010; Tiwana & Keil, 2009) and some studies also examine control-mode interaction effects (e.g., Chua et al., 2021; Wiener et al., 2015), including complementary and substitutive effects (Tiwana, 2010). In this context, it is well established in existing literature that controllers combine formal and informal controls into a portfolio of control modes (referred to as control-mode ambidexterity in this study—see

[2] We are grateful to one anonymous reviewer for her/his valuable comments on key conceptual differences between control and leadership styles.

section 2.3) and that this 'portfolio' control approach is generally conducive to the performance of IS projects (e.g., Choudhury & Sabherwal, 2003; Kirsch, 1997; Wiener et al. 2016).

In contrast, although recent studies highlight the importance of considering control styles together with control modes (e.g., Gregory et al., 2013; Wiener et al., 2016), empirical research on this topic remains scant (Remus et al., 2020). An overview of key IS project control studies that look into control styles and modes is provided in Table 2. Most of these studies focus on the antecedents and dynamics of control-style choices (Gregory et al., 2013; Heumann et al., 2015), as well as on the performance effects of different control styles (Remus et al., 2020; Wiener et al., 2017). Moreover, two studies show an explicit focus on the interplay between control modes and control styles. In particular, based on a case study of two wireless communication product development projects, Liu and Chua (2020) demonstrate that the control style used determines whether the enactment of formal control promotes or hinders the controlee's use of self-control. Further, Gregory and Keil (2014) find that the successful management of IS projects requires what they refer to as "control ambidexterity" (p. 343) to meet the conflicting demands of such projects, and that the tensions resulting from control-mode ambidexterity can be dealt with effectively by a tandem of two project managers who use contrasting control styles. In addition, from a methodological standpoint, it seems noteworthy that the handful of studies investigating both control modes and styles are either case study-based (Liu & Chua, 2020; Gregory et al., 2013; Gregory & Keil, 2014; Heumann et al., 2015), potentially limiting generalizability claims, or rely on cross-sectional survey data collected from only one side of the control dyad, i.e., from controllers (Wiener et al., 2017) or controlees (Remus et al., 2020).

Table 2. Overview of key studies on control styles (and modes)

Study	**Context (Control dyad/s)**	**Focus**	**Methodology**	**Key findings**
Liu & Chua (2020)	Complex, internal IT projects (project manager vs. project team members)	Interplay of control styles and controlee self-control	Case study (based on 17 interviews in two projects)	While the use of an enabling control style can induce controlees to act to the benefit of both the controller and the controlee, an authoritative control style encourages controlees' self-interested behavior.
Gregory, et al. (2013)	Offshored IS development project (client vs. vendor)	Control balancing and evolution (dynamics)	Longitudinal case study (based on 56 interviews with client and vendor employees)	Control balancing in terms of control type, degree, and style allows the IS offshoring project to progress toward its goals. Balancing activities are highly intertwined with the development of shared client-vendor understanding.
Gregory and Keil (2014)	IS implementation project (project managers vs. project team members)	Control ambidexterity	Single case study (based on 39 interviews)	Control ambidexterity is required to meet conflicting demands of IS projects. Tensions of control-mode ambidexterity can be dealt with effectively by a tandem of two project managers using contrasting control styles (bureaucratic and collaborative).

Heumann, et al. (2015)	Internal IS project (senior managers vs. project leaders vs. project team)	Control-mode and control-style choices	Single case study (based on 30 interviews)	Senior managers and project leaders differ in their use of control styles but not in their use of control modes. Legitimacy concerns, performance problems, and task complexity influence control-style choices.
Remus et al. (2020)	Internal and outsourced IS development projects (project manager vs. project team members)	Effects of control styles and control modes on individual-level outcomes	Cross-sectional survey (data from 171 projects)	Control style is more important than control modes in explaining individual-level control effects on task performance and job satisfaction. Post-hoc analysis suggests complex interaction effects between an enabling control style and formal control.
Wiener, et al. (2017)	Internal and outsourced IS projects (senior executive vs. project manager)	Effects of control styles on IS project performance	Cross-sectional survey (data from 92 projects)	Executives' use of an enabling control style is positively related to IS project performance, whereas their use of an authoritative control style is found to be negatively related to performance. Still, use of this control style seems to play a critical role in successfully enacting formal controls.

In summary, it can be said that extant literature has largely focused on the direct and interactive effects of formal and informal control modes on IS project performance, where studies on control styles and their performance effects are still few in number. Corresponding studies point to the need for 'both/and' control approaches—as opposed to 'either/or' approaches (Lewis et al., 2002), and in particular to the need for ambidextrous control approaches to meet the conflicting demands of IS projects in the digital era (Gregory & Keil, 2014; Wiener et al., 2019).

2.3 Control ambidexterity

Broadly speaking, ambidexterity refers to the ability of an individual to work with both hands with equal ease. Ever since Duncan (1976) published her pioneering article, the ambidexterity concept has been increasingly used by scholars to describe the ability of an organization to combine contrasting activities in order to optimally leverage organizational resources (Gibson & Birkinshaw, 2004; Lee, Sambamurthy, Lim, & Wei, 2015; Napier, Mathiassen, & Robey, 2011). Contributing to research on organizational ambidexterity, numerous literature streams—including technology and innovation management, strategy, and organizational theory—suggest that organizations succeeding in reconciling and harnessing such combined and simultaneous pursuit are more effective than others in improving performance (O'Reilly & Tushman, 2013). While extant literature has often investigated the ambidexterity concept at the organizational level (e.g., Andriopoulos & Lewis, 2009), it has also studied this concept at the project level (e.g., Gregory & Keil, 2014) and the individual level (e.g., Rogan & Mors, 2014).

A central argument for why IS project managers may benefit from the simultaneous use of different control activities is that these activities can complement one another (Gregory & Keil, 2014; Kreutzer et al., 2016; Tiwana, 2010), especially since project goals and team composition have been found to be increasingly diverse in today's digital era (Gregory et al., 2015; Wiener et al., 2019). In this regard, Lewis et al. (2002) argue that in "our tough, dynamic, and demanding world, 'either/or' approaches are no longer viable" and that "today's challenges of fast change and uncertainty require 'both/and' approaches to thinking and working" (p. 547). It is against this backdrop that Gregory and Keil (2014) introduced the concept of control ambidexterity, which they define as the simultaneous "use of different types of control to meet conflicting demands" (p. 343), thereby further emphasizing the need to combine formal and informal controls into a balanced control portfolio (Choudhury & Sabherwal, 2003; Kirsch, 1997). While not being explicit about the scope of their control ambidexterity concept, Gregory and Keil (2014) seem to use it primarily in relation to control modes, referred to as *control-mode ambidexterity* in our study. However, their study leaves open questions as to whether control ambidexterity can be achieved by an individual controller (rather than a tandem of two project managers who share responsibility for managing an IS project), as well as with regard to the effectiveness of simultaneously using contrasting control styles, which is referred to as *control-style ambidexterity* and represents the focus of our study.

To conceptualize the notion(s) of control-style (and control-mode) ambidexterity in the specific context of IS projects, we draw on the organizational ambidexterity literature and in particular on the concept of *contextual* ambidexterity (Gibson & Birkinshaw, 2004). On this conceptual basis, our study defines control-style (and control-mode) ambidexterity as the simultaneous use of directive and participative control styles (and formal and informal control modes, respectively) in response to different contextual requirements. This definition is reflective of our key argument that controllers can adopt directive and participative control styles at the same time and in relation to the same controlees when managing different IS project tasks. For instance, an IS project manager may use a directive control style to ensure that team members adhere to standard practices and meet predefined milestones; simultaneously, she or he may use a participative control style to enact control over more complex and/or creative project tasks. Here, the use of a directive control style can help exploit available project resources and expedite the effective implementation of clearly defined (routine) tasks, whereas the use of a participative style is likely to facilitate the exploration of new ideas and creative solutions to problems encountered in a given IS project. In this regard, it has to be acknowledged that the simultaneous use of two contrasting control styles (i.e., the practical application of control-style ambidexterity) is anything but 'easy', since it necessitates a manager who is not only sensitive to contextual requirements but also adaptive and deft at applying different control styles in response to relevant contextual requirements.

Regarding our conceptualization of control-style (and control-mode) ambidexterity in terms of contextual ambidexterity, it should be noted that prior literature points to two additional types of ambidexterity: structural and temporal/sequential ambidexterity. These types, however, were deemed less relevant in the specific context of our study. Please refer to Table 3 for a brief overview and discussion of the three ambidexterity concepts.

Table 3. Overview of ambidexterity concepts

Concept	Definition	Relevance to our study
Structural ambidexterity	Simultaneous use of contrasting control/ management activities in relation to different organizational units, projects, etc. (O'Reilly & Tushman, 2004)	Given our study's focus on the control tactics/ styles used within a single organizational unit (IS project), the concept of structural ambidexterity is less relevant.
Temporal/sequential ambidexterity	Use of contrasting control/management activities at different points in time (Tushman & O'Reilly, 1996)	Studying the concept of temporal/sequential ambidexterity requires access to longitudinal data, and probably the use of a qualitative research approach (e.g., an in-depth case study); as such this concept is less relevant to our study as well.
Contextual ambidexterity	Simultaneous use of contrasting control/ management activities in response to different contextual requirements (Gibson & Birkinshaw, 2004)	Adopted in our study (see definitions of control-style and control-mode ambidexterity provided above).

Based on the insights gained from our literature review (see section 2.2) and the conceptual foundations introduced above, our study sets forth to theoretically develop and empirically test the direct and interactive effects of control-style ambidexterity on IS project performance.

3 HYPOTHESIS DEVELOPMENT

In the following, we develop our research hypotheses regarding the direct effect of control-style ambidexterity on IS project performance (3.1), as well as regarding its interactive performance effects with formal and informal control (3.2). Given the exploratory nature of our study, and in order to accurately reflect the somewhat controversial discussion in extant literature, we present alternative hypotheses for both the direct and interactive effects of control-style ambidexterity. On the other hand, since earlier literature offers convincing empirical support for the performance-enhancing effect of control-mode ambidexterity (i.e., for the effectiveness of 'balanced' control portfolios), we refrain from presenting a dedicated hypothesis for this relationship.

3.1 Direct effect of control-style ambidexterity on IS project performance

IS projects are inherently complex and nonlinear with an ever-changing cycle of critical events or requirements, and challenge project managers with paradoxes and tensions (Gregory et al. 2015). In this regard, prior research points to the need for a combination of 'hard' elements (e.g., managers enforcing procedures and guidelines to ensure project efficiency and quality) and 'soft' elements (e.g., managers involving project team members in control processes and appreciating their feedback on these processes) in order to effectively deal with the paradoxes/tensions inherent in IS projects (Gregory & Keil, 2014). Put differently, drawing on paradox and ambidexterity theory, we argue that IS project managers need to develop an ambidexterity capability to resolve paradoxical tensions (Gregory et al. 2015). The central idea is that increasingly complex and diverse IS project tasks require the adoption of an equally complex and diverse control approach that responds to contextual project (task) requirements through the combination of contrasting control styles (i.e., control-style ambidexterity). Relatedly, earlier research highlights that paradoxical demands in IS projects become recurrently salient, triggering a project manager's ambidexterity to confront these demands simultaneously (Gregory et al. 2013; Gregory et al. 2015; Robey et al. 2002).

In addition, existing studies indicate that different control styles have unique benefits and performance effects. More specifically, it has been argued that enacting controls in an enabling (participative) control style is particularly beneficial for IS project quality, whereas the use of an authoritative (directive) control style is conducive to IS project efficiency (Wiener et al., 2016). In essence, this implies that IS project performance—commonly defined in terms of project efficiency and quality (Gopal & Gosain, 2010; Wiener et al., 2015)—can only be achieved through control-style ambidexterity. For instance, IS project managers are required to emphasize efficiency in order to ensure that a given IS project is completed on time and within budget (e.g., Keil et al., 2013); at the same time, however, they have to emphasize project quality in order to ensure that a project meets requirements (e.g., Gopal & Gosain, 2010). These competing demands necessitate the simultaneous use of different types of control activities (Gregory & Keil, 2014), and in particular the adoption of an ambidextrous control approach that combines contrasting control styles (i.e., control-style ambidexterity). For example, by combining a directive control style with a participative one, IS project managers can leverage the formal authority derived from their position to clarify project roles and responsibilities, and thus to ensure project efficiency, while simultaneously leveraging the diverse knowledge and skills of IS project team members by engaging in frequent interactions with them and appreciating their feedback, thereby also facilitating multi-sided learning processes and compensating for knowledge gaps on the controller side (Wiener et al., 2017; Wiener et al., 2016).

On the contrary, focusing on a single control style (i.e., using either a directive or a participative style) to enact controls may, for example, lead to an overreliance on formal authority, or a lack thereof, which in turn can lead to distinct unintended downstream effects such as controlee resistance or control loss (e.g., Remus et al., 2020; Wiener et al., 2016). Here, control-style ambidexterity is supposed to enable IS project managers to get the 'best from both worlds' by combining directive and participative control styles and by subtly adapting their use of these styles as per the contextual requirements of different project tasks. Hence, we hypothesize:

H1: *Control-style ambidexterity, i.e., a project manager's simultaneous use of a directive and a participative control style, is positively related to IS project performance.*

On the other hand, prior literature also presents arguments that question the performance benefits of control-style ambidexterity. For example, in line with the conceptual distinction between directive and participative control styles adopted in our study, existing IS project control studies conceptualize distinct control styles as end points on a continuum (Gregory et al., 2013; Gregory & Keil, 2014; Wiener et al., 2016). This conceptual understanding of basic control styles points to considerable tensions between such styles (Remus et al. 2020). As such, it might be quite challenging for an IS project manager to simultaneously use a directive and a participative control style. Here, Gregory and Keil (2014) suggest that control-style ambidexterity can be achieved by a tandem of two IS project managers, where one manager relies on a bureaucratic (directive) control style, whereas the other manager uses a collaborative (participative) control style. Adding to this, a controller's simultaneous use of distinct control styles may be challenging, or confusing, for IS project team members as well, which may ultimately impede overall project performance. For instance, control-style ambidexterity may give rise to gaps in shared understanding between controller and controlees, which in turn may have a negative effect on the efficiency of project processes and/or the quality of project outcomes (Gregory et al., 2013). Also, it may lead to role ambiguities, since IS project team members will seek clear signals from their project manager regarding the roles they are expected to take on (Martin, 2009). As such, the simultaneous use of contrasting control styles by an IS project manager also puts high demands on team members, and in particular on their adaptiveness. Consequently, project team members may feel an increase in job stress, impacting their work quality and quantity (Rosing et al., 2011). Based on the above arguments, an alternative hypothesis would be:

$H1_{Alt}$: *Control-style ambidexterity, i.e., a project manager's simultaneous use of a directive and a participative control style, is negatively related to IS project performance.*

3.2 Interactive effects of control-style ambidexterity on IS project performance

Following the theoretical arguments made in Gregory et al. (2013) and Wiener et al. (2016), we expect that control-style ambidexterity also interacts with both formal and informal control modes to influence IS project performance. For example, Gregory et al. (2013) argue that "for any given control configuration, the individual control modes and mechanisms will tend to have a high level of correlation with respect to control degree and style" (p. 1229). Similarly, Wiener et al. (2016) argue that studies "taking the approach that single control modes are by themselves more or less effective […] risk ignoring key aspects of how control works," and therefore direct attention toward the question of "how both control portfolio configurations [in terms of modes] and control enactment [in terms of styles] impact the performance of IS projects" (p. 767). In this context, Gregory and Keil (2014) find that the effective management of IS projects requires the use of different types of control (i.e., formal and informal control) along with the use of contrasting control styles (i.e., control-style ambidexterity). This finding can be explained by the unique features and advantages of such control styles, enabling project managers to meet the conflicting demands of IS projects in the digital era (Wiener et al., 2019). For example, while the repair feature of a participative control style helps spur controlee motivation and compensate for knowledge gaps (Remus et al., 2020), the lack of repair that characterizes a directive control style helps in enforcing formal authority but also in establishing work norms and values motivating goal-directed controlee behaviors (Wiener et al., 2016). As such, control-style ambidexterity enables IS project managers to provide controlees with clear work directions, while also empowering them. This combination, in turn, can be expected to be conducive to the effectiveness of both formal control (e.g., by enforcing controllers' formal authority, while allowing for knowledge compensation) and informal control (e.g., by establishing controller-induced work norms and values, while driving controlee motivation). The superior effectiveness of such an approach to enacting formal and informal control finds also support in Lewis et al. (2002) who posit that the digital-era challenges of IS projects demand 'both/and' approaches to how managers think and work (cf. Wiener et al., 2019). On this basis, we suggest:

H2: *Control-style ambidexterity strengthens the extent to which (a) formal control and (b) informal control enhance IS project performance.*

Still, we would like to acknowledge that Gregory and Keil's (2014) study also points to a counterargument regarding the above-presented reasoning. In particular, while their study offers empirical support for the importance of control-style ambidexterity in successfully managing IS projects, and especially in effectively enacting both formal and informal control, it also suggests that control-style ambidexterity "creates tensions that are extremely difficult to cope with by a single project manager" (p. 353). In this regard, they find that the tensions resulting from the simultaneous use of two contrasting control styles "can be dealt with effectively by a tandem of two project managers who share responsibility for managing the IS project" (p. 353), thereby questioning the practicability and effectiveness of control-style ambidexterity in relation to IS projects that are controlled by a single project manager. In addition, while Wiener et al. (2016) point out that both formal and informal control can be enacted by any control style, Gregory and Keil's (2014) study seems to be based on the assumption that the use of a bureaucratic (directive) and a collaborative (participative) control style are conducive to the effective enactment of formal control and informal control, respectively. In other words, they seem to suggest that a directive control style complements the enactment of formal control (but not informal control), whereas a participative control style complements the enactment of informal control (but not formal control). This leads to the following alternative hypothesis:

$H2_{Alt}$: *Control-style ambidexterity weakens the extent to which (a) formal control and (b) informal control enhance IS project performance.*

4 RESEARCH METHODOLOGY

4.1 Empirical context and data collection

Our data collection involved a sampling frame of 1,000 high-tech firms drawn from the FAME (Financial Analysis Made Easy) database of firms registered in the UK. The advantage of using the FAME database is that it provides complete descriptive information on all UK-based small, medium, and large firms, including the ones not listed on the London Stock Exchange. Further, past studies that have used this database have reported acceptable response rates (e.g., Crick & Spence, 2005). To select relevant firms, we used a systematic random selection procedure based on a variety of criteria, including the date of registration (over three years) and industry (technological specialties).[3]

High-tech firms from the UK represent an appropriate empirical setting for this study because the British government has introduced large-scale initiatives (e.g., The Tech City, Living Innovation) in an attempt to encourage growth in technology-intensive firms (Oke, Burke, & Myers, 2007). Ranking 15th among the world innovation enablers in the 2009-2013 Innovation Index (Economist Intelligence Unit, 2009), UK high-tech firms provide a rich context to examine the performance of IS projects. The high-tech sector in the UK is, apart from the USA and Taiwan, one of the most important supplier of high-tech products in the world (Oke et al., 2007). Due to fast-paced technological changes, technology-intensive firms are required to react promptly, develop mechanisms to assess opportunities quickly, and allocate project resources adequately in order to reap desired benefits (Chandrasekaran, Linderman, & Schroeder, 2012). In such uncertain and demanding project environments, an ambidextrous approach to controlling IS projects appears to be particularly beneficial (Gregory & Keil, 2014). Also, high-tech firms operate in a competitive environment where the importance of project performance (completion on time, within budget, and in adherence with technical and quality targets) is critical to a firm's growth and survival. As such, project managers and the effectiveness of their control tactics play a crucial role in the context of high-tech firms (Crick & Spence, 2005). As well, focusing exclusively on the high-tech sector, we are able to effectively minimize industry-level effects that may confound our findings, as some earlier studies find that industry type can influence project performance (Tsai & Yang, 2013).

To collect data on our study's focal constructs (i.e., control styles, control modes, and IS project performance), we developed a survey instrument. To improve content validity and response rates, the online questionnaire was designed, formulated, and implemented in a manner that closely followed the recommendations by Podsakoff, MacKenzie, Lee, & Podsakoff (2003). To minimize the risk of ambiguity, the survey questionnaire was pretested with three senior IS scholars. Before emailing the online

[3] Technological specialities firms include manufacturing and service firms in various industries (e.g., computer and electronic, precision equipment tools, telecommunication equipment, medical equipment), all of which are included in NAICS 2012 industry classification under codes 51, 54, 334, and 335.

questionnaire link to our key respondents, we contacted them by phone. The survey was distributed to IS project managers who filled in the first part of the questionnaire (control modes, except for self-control, and IS project performance). Following Keil et al. (2013), respondents were asked to fill in the questionnaire in relation to IS projects that had been completed most recently (to avoid recall issues). Project managers were then asked to identify appropriate IS project team members who used a separate survey link to complete the second part of the questionnaire (self-control and control styles). This was done since team members were deemed to be in a better position to assess their use of self-control, as well as to provide impartial answers on the project manager's control styles. Relying on senior managers to distribute the surveys helped identify appropriate respondents and is consistent with prior IS studies (e.g., Keil et al., 2013; Mähring et al., 2018). Further, the online survey tool recorded the IP addresses of the respondents completing the survey. We used this information to check that the two surveys recorded at least two distinct IP addresses and thus to ensure that they had been completed by different respondents (i.e., IS project managers vs. team members). Using matched-pair data helps reduce the threat of biases (Podsakoff & Organ, 1986). Moreover, we gathered secondary data for some of the control variables (e.g., total number of employees and industry characteristics of sample firms) from the FAME database, as well as for relevant accounting measures (return on assets [ROA], return on equity [ROE], and return on investment [ROI]) from the *Bloomberg* and *DataStream* databases.

After two follow-up reminders (by phone and email), matched responses from 157 projects (and 157 firm) had been received. Unfortunately, eleven responses were ineligible due to incomplete information, missing data values, and disengagement (as indicated by straight-lining and/or a survey completion time of less than three minutes), resulting in a final sample of valid matched-pair responses from 146 projects. This sample size is deemed to be strong, especially when compared to earlier IS project control studies using matched-pair data: sample sizes of 138 (Rustagi et al., 2008) and 86 (Wiener et al., 2015). The IS project managers and team members who had participated in our survey had been working in their firms for an average of 11.85 and 6.45 years, respectively. Table 4 summarizes key characteristics of the surveyed firms and projects.

Table 4. Data sample characteristics

	Frequency	**Relative percentage**
Firm size		
Small (49 full-time employees or less)	28	19%
Medium (50-249 full-time employees)	75	51%
Large (250 full-time employees and more)	43	30%
Firm age		
Between 5 and 10 years	14	10%
Between 10 and 15 years	43	29%

15 years and more	89	61%
Project duration		
Between 1 and 6 months	44	30%
Between 7 and 12 months	56	39%
Between 13 and 18 months	29	20%
Between 19 and 24 months	15	10%
25 months and more	2	1%
Project cost		
Less than 10,000 GBP	49	33%
Between 10,000 and 50,000 GBP	71	49%
Between 50,000 and 100,000 GBP	22	15%
100,000 GBP and more	4	3%

In order to calculate the minimum sample size required for a proper estimation of our research model, we performed a statistical power analysis (Benitez, Ray, & Henseler, 2018). With seven predictors (maximum number of structural links received by IS project performance), and anticipating a medium effect size ($f^2 = 0.150$), a desired statistical power level of 0.80, and a confidence level of 0.05, our model required a sample size of at least 98 data points (Cohen, 1988). Our sample size was 146 projects and thus adequate to estimate the model; that is, the power analysis results suggested that our sample had sufficient statistical power to detect significant effects (Cohen, 1988).

4.2 Construct measures

To measure control-style ambidexterity (i.e., the simultaneous use of directive and participative control styles), formal and informal control, and IS project performance, we adopted well-established scales from extant studies. All measurement items were rated on five-point Likert scales with "strongly disagree" and "strongly agree" anchors.

Control-style ambidexterity: In line with prior operationalizations of the ambidexterity construct (e.g., Gibson & Birkinshaw, 2004; Lee et al., 2015; Mom et al., 2009), control-style ambidexterity was operationalized as the multiplicative interaction of directive and participative control styles. The multiplicative interaction suggests that the two styles are non-substitutable and interdependent (Gibson & Birkinshaw, 2004). The higher the multiplicative score, the more a controller relies on the simultaneous use of both control styles. Here, it should be noted that other studies modeled ambidexterity as a second-order construct (e.g., Benitez et al., 2017; Syed, Blome, & Papadopoulos, 2019). When testing our hypotheses, we thus also considered an alternative operationalization of control-style ambidexterity (i.e., as a two-dimensional second-order construct in a reflective-formative type).

Directive and participative control style were measured reflectively with four and three items, respectively (see Table 5 below). Specifically, the four items for directive control style measured the extent to which an IS project manager relied on her/his formal authority (lack of repair) by scheduling work tasks, defining definite standards, and clarifying her/his attitudes and expectations; the three items for participative control style assessed the extent to which a project manager relied on collaborative actions (repair) by asking for suggestions, consulting team members on project problems, and offering advice on project assignments. All items are based on the studies by Schriesheim and Kerr (1974) and Lewis et al. (2002) and were iteratively refined for clarity and focus based on discussions with three senior IS scholars during the survey pretest.

Formal and informal control: In line with earlier IS project control studies (Keil et al., 2013; Remus et al., 2020), both formal and informal control were modeled as multidimensional second-order constructs in a reflective-formative type (Hair et al., 2017). Formal and informal control included the corresponding control modes as reflective first-order constructs. Measures for formal input, behavior, and outcome control, as well as for informal clan and self-control, were adopted from key control studies by Keil et al. (2013), Kirsch, Sambamurthy, Ko, & Purvis (2002), and Wiener et al. (2017). Further, to empirically confirm the performance-enhancing effect of control-mode ambidexterity suggested in earlier literature, we also included this construct in our data analysis. Consistent with our operationalization of control-style ambidexterity (see above), we operationalized control-mode ambidexterity as the multiplicative interaction of formal and informal control.

IS project performance: To measure IS project performance, we adopted the four reflective items used in Wiener, et al. (2015). Capturing efficiency and quality aspects, these items assess project performance in terms of cost and time adherence, as well as in terms of adhering to technical requirements and IS standards. Although a self-reported measure of IS project performance can be criticized for its subjectivity, it has its advantages because archival accounting ratios are not readily available at the IS project level. Following the methodological procedures used in earlier studies (e.g., Gibson & Birkinshaw, 2004; Pavlou & El Sawy, 2006), we collected objective accounting measures (ROA, ROE, and ROI) for all participating firms to validate the subjective performance measure. The objective measures of financial performance captured directly from *Bloomberg* and *DataStream* highly correlated ($r = .72$, $p < .05$, $r = .64$, $p < .05$, and $r = .58$, $p < 0.10$) with the subjective performance ratings captured from project managers, providing external validity to the subjective measures.

Control variables: We included firm and project-related control variables to account for their potential confounding effects on the dependent variable (IS project performance). The availability of organizational resources has been identified as a contingency factor for ambidexterity itself (Chandrasekaran et al., 2012; Syed et al., 2020). Thus, project team size (measured by the natural logarithm of the number of employees in the project) was included as a control variable. Relatedly, a heterogeneous project team might affect the controller's control-mode and control-style choices. We thus included IS project team heterogeneity as a control variable as well.[4] In addition, it has been argued that managers working in younger firms may be in a better position to combine different control tactics since they are arguably less likely to face organizational inertia and/or competency traps; on the other hand, it has also been argued that younger firms may have a too limited pool of resources, making it difficult to benefit from ambidextrous approaches (Lubatkin, Simsek, Ling, & Veiga, 2006; Syed et al., 2019). For this reason, we added firm age (measured as the natural logarithm of the number of years a firm has been in business) as a control variable. Finally, existing studies indicate that IS project performance can be affected by project size, since larger projects are more likely to incur higher costs and longer durations (Rai, Maruping, & Venkatesh, 2009; Wallace, Keil, & Rai, 2004). We thus also added project cost and project duration—two indicators for project size (Keil et al., 2013)—as control variables to our model.

4.3 Methodological checks on biases

To check for a potential non-response bias, we performed two tests: one using survey data and the other one using secondary data. First, we examined differences between early respondents and late respondents based on all focal study constructs.[5] Second, we used data from the FAME database to compare respondents with non-respondents (e.g., in terms of firm age and size, industry type). Based on t-tests, group comparisons did not reveal any significant differences ($p < 0.05$), providing assurance against a systematic non-response bias (Armstrong & Overton, 1977).

A major source of common method biases (CMB) pertains to the threat of common rater bias, which has been effectively addressed by our study's use of a multi-informant approach (i.e., the collection of matched-pair data) (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). To further reduce the CMB risk, we followed several procedural remedies in the survey design (Podsakoff et al., 2003). For example, the survey instrument ensured anonymity and confidentiality of responses to participants. Also, survey participants were assured that there is no right or wrong answer to survey questions and that they should answer questions as honestly as possible, reducing the risk of participants providing socially desirable responses. Moreover, we mixed the order of predictor and criterion variables to control for any priming effects and item-context induced mood states. Adding to this, we used statistical analyses and tests to check for CMB. Here, studies have suggested that the presence of CMB can undermine the significance of interaction coefficients (Siemsen, Roth, & Oliveira, 2010). Our data analysis results, however, reveal significant interaction effects (see Table 8 in section 5.2), suggesting that CMB is unlikely to be a problem in our study. Finally, we also performed a methodological test for CMB by including a marker

[4] To measure IS project team heterogeneity, we adopted the three-item scale from Campion et al. (1993). This scale assesses team heterogeneity in terms of both demographic and functional attributes (i.e., background, expertise, and skills).

[5] The survey participants that responded to the second follow-up reminder were considered as late respondents. Generally, late respondents are assumed to be similar to non-respondents (Keil et al., 2013).

variable (a single-item variable measuring a respondent's level of expertise on a five-point Likert scale) in our model. In line with Ronkko and Ylitalo's (2011) recommendation, the marker variable showed minimal correlations with focal constructs. Regression results for the baseline model were found to be similar to the regression results of the model that included the marker variable (in terms of path coefficients and significance levels), offering additional support that CMB is unlikely to be a problem with our study (Ronkko & Ylitalo, 2011).

5 DATA ANALYSIS AND RESULTS

We used partial least squares (PLS), a variance-based structural equation modeling (SEM) approach, to evaluate both our measurement and structural model. The choice of PLS-SEM is appropriate, given our study's focus on predicting key target constructs and its exploratory nature (e.g., Benitez et al., 2020; Ringle, Sarstedt, & Straub, 2012) and since our research model includes second-order constructs of a reflective-formative type (Henseler et al., 2014; Rigdon et al., 2014). Also, in contrast to covariance-based SEM, PLS-SEM provides more accurate results as it is based on composites (as opposed to factors) that do not require a multivariate normal data distribution (Ajamieh, Benitez, Braojos, & Gelhard, 2016). Moreover, PLS-SEM is a well-known and commonly adopted data analysis approach in IS (Benitez et al., 2018; Syed et al., 2019). To run our analyses, we used the software tool *Advanced Analysis for Composites (ADANCO)* 2.0 *Professional* developed by Henseler and Dijkstra (2015), which supports both causal and predictive modeling (Benitez et al., 2018; Syed et al., 2020).

5.1 Measurement model evaluation

To evaluate the measurement model, we followed established guidelines (e.g., Becker, Klein, & Wetzels, 2012; Hair et al., 2017). As noted above, all first-order constructs were measured reflectively with multiple items. To ensure item reliability, we analyzed the loadings of all construct items, all of which are above the threshold of 0.7 (Hair et al., 2017), with the exception of one directive control style item being slightly below this threshold (0.688). In terms of construct reliability and convergent validity, all constructs exceed the suggested thresholds of 0.7 and 0.5 for Cronbach's Alpha (CA) and average variance extracted (AVE) (Fornell & Larcker, 1981), as well as the recommended threshold (0.8) for composite reliability (CR). Please refer to Table 5 for details on item loadings, as well as CA, CR, and AVE values. Further, the square root of each construct's AVE is greater than the highest correlation with any other construct and the loadings of construct items are greater than cross loadings (Fornell & Larcker, 1981), establishing discriminant validity (see Table 9 and Table 10 in the Appendix). In addition, we examined the heterotrait-monotrait (HTMT) ratio of construct correlations, which is an alternative approach to assessing discriminant validity (Henseler et al., 2015). All HTMT values are below the threshold of 0.9 (see Table 11 in the Appendix).

The second-order constructs for formal and informal control were assessed following the methodological guidelines of Mackenzie, Podsakoff, and Podsakoff (2011) for superordinate constructs. First, construct validity was assessed by manually calculating the adequacy coefficient R^2_a for each second-order construct (Edwards, 2001). The R^2_a values exceed the threshold of 0.5 (formal control: 0.51; informal control: 0.62), suggesting that the majority of the variance in the first-order constructs is shared with their corresponding second-order construct (Mackenzie et al., 2011). Second, the weights of all construct dimensions are significant (see Table 5). Third, the variance inflation factor (VIF) values for all first-order construct items and second-order construct dimensions (ranging from 1.002 to 3.345) are clearly below the threshold of 10 (Syed et al., 2019; Gruber, Heinemann, Brettel, & Hungeling, 2010), indicating that multicollinearity is unlikely to be an issue. Table 6 shows the minimum, maximum, and mean values (and standard deviations) for our study's key constructs and control variables, as well as their correlations.

Table 5. Measurement model evaluation

Construct/Indicator	**VIF**	**Weight**	**Loading**
Control-style ambidexterity (multiplicative)			
Directive control style *(CA=0.84, CR= 0.90, AVE=0.62)*	3.349		
Our project manager provides schedules for the work to be done		0.109	0.846**
Our project manager maintains definite standards of performance		0.334***	0.724***
Our project manager makes his attitudes clear to the group		0.123***	0.765***
Our project manager informs us about what is expected of us		0.318***	0.688**
Participative control style *(CA=0.81, CR=0.88, AVE=0.53)*	2.735		
Our project manager asks for suggestions before taking actions		0.308***	0.929***
Our project manager consults us when faced with project problems		0.426***	0.981***
Our project manager advises us on our assignments		0.371***	0.714***
Formal control (formative)	3.082		
Input control *(CA=0.78, CR=0.85, AVE=0.57)*	2.931	0.349***	0.776***
I have gone to great lengths to establish the best possible staffing procedure for the IS project		0.384***	0.787***
I take pride in the fact that I assigned the best people to the IS project		0.616***	0.813***
Behavior control *(CA=0.72, CR=0.81, AVE=0.69)*	1.002	0.450***	0.769**
I expected the project team to follow an understandable written sequence of steps toward the accomplishment of project goals		0.278***	0.870***
I expected the project team to follow articulated written system development rules toward the accomplishment of project goals		0.350***	0.787**
I assessed the extent to which existing written procedures and practices were followed during the development process		0.413**	0.949***
Outcome control *(CA=0.82, CR=0.88, AVE=0.54)*	1.003	0.319**	0.936***
I placed significant weight upon timely project completion		0.277***	0.822***
I placed significant weight upon project completion within budgeted costs		0.360***	0.848***
I placed significant weight upon project completion to the satisfaction of the user		0.244***	0.775***

I used pre-established targets as benchmarks for development team performance evaluations		0.297**	0.843***
Informal control (formative)	2.759		
Clan control *(CA=0.85, CR=0.92, AVE=0.69)*	1.224	0.644***	0.874***
I actively participated in project meetings to understand the development team's goals, values, and norms		0.235***	0.824***
I attempted to be a 'regular' member of the development team		0.190***	0.753***
I attempted to understand the development team's goals, norms, and values		0.115*	0.874***
I attempted to form a committee that often communicated with development team		0.242***	0.826***
I actively joined with development team for important decision making		0.366**	0.788**
Self-control *(CA=0.82, CR=0.87, AVE=0.65)*	1.224	0.537***	0.812***
Our project team autonomously set specific goals for this project without the involvement of the project manager		0.296**	0.843***
Our project team autonomously defined specific procedures for this project's activities without the involvement of the project manager		0.153***	0.906***
Our project team autonomously set specific timelines for this project without the involvement of the project manager		0.416***	0.853**
Our project team autonomously chose experienced IT professionals for the project development		0.260***	0.798***
IS project performance *(CA=0.84, CR=0.90, AVE=0.60)*	3.354		
The project deliverables were completed on time		0.198**	0.892***
The project deliverables were completed within allocated budget		0.139†	0.933***
The project deliverables met the technical requirements		0.379***	0.881***
The project deliverables adhered to IS standards		0.345**	0.938***

Notes: †$p < 0.10$, *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$ [based on 5000 subsamples, one-tailed test].
CA = Cronbach's Alpha, CR = Composite Reliability, AVE = Average Variance Extracted

Table 6. Construct correlations (and descriptive statistics)

	Min	Max	Mean (SD)	1	2.1	2.2	3	4	5	6	7	8
1 CSA	1.00	25.0	15.54 (6.52)	1.00								
2.1 Formal control	1.00	5.00	3.17 (1.03)	**0.25**	1.00							
2.2 Informal control	1.00	5.00	3.13 (1.09)	0.13	0.15	1.00						
3 Project perform.	1.00	5.00	3.01 (1.14)	**0.26**	**0.22**	**0.30**	1.00					
4 Team size (Ln)	2.08	3.33	2.67 (0.46)	**0.22**	0.19	**-0.25**	0.14	1.00				
5 Team heterogeneity	1.00	5.00	3.61 (1.06)	0.11	**-0.23**	-0.17	**0.29**	**0.31**	1.00			
6 Firm age (Ln)	1.81	3.71	2.83 (0.94)	0.19	0.04	0.19	0.16	**0.22**	0.15	1.00		
7 Project cost (Ln)	1.62	4.85	3.04 (1.33)	**0.21**	-0.02	-0.16	0.12	0.04	0.14	**0.21**	1.00	
8 Project duration (Ln)	1.09	3.46	2.47 (0.85)	0.06	-0.06	**0.21**	0.11	**0.24**	-0.13	**0.23**	**0.47**	1.00

Notes: CSA = Control-style ambidexterity; bold values indicate significant correlations ($p < 0.01$).

Finally, we tested the adequacy and external validity of all model constructs by performing a confirmatory composite analysis, which examines the goodness of model fit based on the discrepancy between the empirical correlation matrix and the correlation matrix implied by the estimated model (Schuberth, Henseler, & Dijkstra, 2018). Compared to the 95%-quantile of the bootstrap discrepancies (see HI_{95} column in Table 7), the lower values of standardized root-mean-squared residual (SRMR), unweighted least squares discrepancy (d_{ULS}), and geodesic discrepancy (d_G) for the estimated model (see *Value* column in Table 7) suggest a good fit between the proposed model and the data (Braojos et al., 2018; Henseler et al., 2016). Overall, the evaluation of the measurement model at the first- and second-order levels suggests that our measures have good measurement properties, and that we can now move on to evaluating our structural model.

Table 7. Confirmatory composite analysis results (saturated model)

Discrepancy	First-order level			Second-order level		
	Value	HI_{95}	Conclusion	Value	HI_{95}	Conclusion
SRMR	0.027	0.032	Supported	0.069	0.084	Supported
d_{ULS}	0.397	0.537	Supported	0.175	0.390	Supported
d_G	0.419	0.488	Supported	0.143	0.187	Supported

5.2 Structural model evaluation

To test our research hypotheses, we created the multiplicative interaction variables (control-mode and control-style ambidexterity)[6] using a two-stage approach (Fassott, Henseler, & Coelho, 2016), assessed the structural model with a bootstrap size of 5,000 subsamples (Hair et al., 2017), and analyzed the path coefficients and significance levels of the hypothesized relationships. Here, we followed Carte and Russell's (2003) three-step process: First, we analyzed the relationships between the control variables and the dependent variable (see Model 1 in Table 8); second, we added the direct effects of control-mode and control-style ambidexterity (Model 2); third, we used three intermediate steps to add the interaction effects of formal control (Model 3) and of informal control (Model 4) with control-style ambidexterity, and finally to include both of these interaction effects in a single model (Model 5). In this regard, it is important to note that the direct effects of control-mode and control-style ambidexterity cannot be interpreted in the presence of interaction effects (Models 3-5), where they represent conditional simple effects (Jaccard & Turrisi, 2003).

For the control variables, our analysis results (see Model 1 in Table 8) show that two variables have a significant effect on the performance of IS projects: while team heterogeneity has a negative effect on IS project performance ($\beta = -0.112, p < 0.01$), firm age is found to have a positive performance effect ($\beta = 0.128, p < 0.01$). The other three control variables (IS project team size, cost, and duration) did not show any significant effects.

[6] As a robustness check, we also analyzed our structural model with an alternative operationalization of control-style ambidexterity. In particular, in line with earlier studies (e.g., Benitez et al., 2017; Syed et al., 2019), we modeled control-style ambidexterity as a two-dimensional second-order construct in a reflective-formative type (Hair et al., 2017) and reran our data analyses. Similar to other studies testing alternative ambidexterity operationalizations (Syed et al., 2019), the analysis results were consistent with the results reported in Table 8 below, demonstrating the robustness of our study results.

Regarding our hypotheses, the data analysis results (Model 2) indicate that control-style ambidexterity is positively related to IS project performance (*β = 0.079, p < 0.05*), providing support for H1 (and no support for the alternative hypothesis). Also, consistent with prior literature, the analysis results show that control-mode ambidexterity has a significant and positive impact (*β = 0.338, p < 0.001*) on IS project performance as well. Furthermore, Model 3 (and 5) point to a significantly positive interaction effect between formal control and control-style ambidexterity on IS project performance (*β = 0.129, p < 0.001*), supporting H2a. As well, Model 4 (and 5) reveal a significant and positive interaction effect of informal control and control-style ambidexterity on the performance of IS projects (*β = 0.095, p < 0.01*), supporting H2b. Again, this implies that the alternative hypotheses (i.e., $H2a_{Alt}$ and $H2b_{Alt}$) are not supported by our data analysis results. A summary of the analysis results is presented in Table 8.

Table 8. PLS-SEM analysis results (effects on IS project performance)

Independent variable/ Control variable (CV)	**Model 1** (direct: CV only)	**Model 2** (direct)	**Model 3** (interaction: FC X CSA)	**Model 4** (interaction: IFC x CSA)	**Model 5** (interaction: FC and IFC)
Control-mode ambidexterity		0.338^{***} (4.965)			0.385^{***} (5.579)
H1: Control-style ambidexterity (CSA)		0.079^{*} (1.488)	$0.067^{\dagger}$ (1.320)	0.078^{*} (1.495)	0.054 (1.010)
Formal control (FC)			0.145^{***} (3.503)		0.138^{**} (3.224)
H2a: FC x CSA			0.129^{***} (3.441)		0.110^{***} (3.373)
Informal control (IFC)				0.074^{**} (2.259)	0.068^{*} (1.898)
H2b: IFC x CSA				0.095^{**} (2.342)	0.086^{*} (2.174)
CV: Team size	0.071 (0.746)	0.089 (0.787)	$0.121^{\dagger}$ (0.895)	$0.105^{\dagger}$ (0.854)	0.093 (0.694)
CV: Team heterogeneity	-0.112^{**} (-2.324)	-0.089^{*} (-1.665)	-0.103^{**} (-2.161)	-0.083^{**} (-2.134)	-0.084^{*} (-1.665)
CV: Firm age	0.128^{**} (3.340)	0.124^{**} (3.260)	0.096^{**} (3.141)	0.101^{**} (3.141)	0.102^{**} (3.142)
CV: Project cost	0.084 (0.178)	0.078 (0.176)	0.059 (0.188)	0.059 (0.188)	0.063 (0.194)
CV: Project duration	0.073 (0.243)	0.072 (0.242)	0.069 (0.213)	0.069 (0.213)	0.071 (0.242)
R^2 (adjusted) in %	**12.2 (10.1)**	**28.4 (26.5)**	**25.1 (21.3)**	**24.6 (22.5)**	**38.7 (36.9)**
ΔF					

Notes: t-values in parentheses; †p < 0.10, *p < 0.05, **p < 0.01, ***p < 0.001 (based on 5,000 subsamples, one-tailed test]

In general, R^2 values are indicative of the explanatory power of a model, with values of 0.19, 0.33, and 0.67 being described as weak, moderate, and strong (Syed et al., 2020; Chin, 2010). For Models 2-5, the R^2 values range from 24.6% to 38.7% (see Table 8 above), indicating a weak to moderate explanatory power. Moreover, we calculated the size of the significant effects (f^2 values), with f^2 values of 0.02, 0.15, and 0.35 signifying small, moderate, and large effect sizes (Cohen, 1988). While control-style and control-mode ambidexterity, respectively, have a weak (f^2 = 0.080) and a strong (f^2 = 0.335) effect on project performance, the interactive performance effects of formal and informal control with control-style ambidexterity show a moderate (f^2 = 0.151) and a weak (f^2 = 0.103) effect size, respectively.

5.3 Post-hoc analyses

In order to facilitate the interpretation of the data analysis results and gain additional insights, we prepared interaction plots to visualize the interactive effects hypothesized in H2a and H2b (see Figure 1). Consistent with H2a, the first interaction plot (left) shows that high levels of formal control and control-style ambidexterity complement each other, leading to a significant increase in IS project performance. In essence, the same applies to the second plot (right), which visualizes the complementary interaction effect between high levels of informal control and control-style ambidexterity on the performance of IS projects, as suggested by H2b. In contrast, both interaction plots point to a (slight) decrease in project performance when IS project managers make use of control-style ambidexterity, but use formal or informal control to a lesser extent. Put differently, in accordance with the PLS-SEM analysis results reported in Table 8 (see above), the two plots show that formal and informal control are more effective when both directive and participative control styles are used simultaneously to enact them.

To further explore the interplay between control modes and control styles, we also analysed the three-way interaction effect of formal control, informal control, and control-style ambidexterity on IS project performance. A visual representation of the analysis results is provided in Figure 2. This representation suggests that IS project managers can achieve superior project performance by combining high levels of formal control, informal control, and control-style ambidexterity, thereby offering additional support for our study’s key assertion that the combination of control-mode and control-style ambidexterity is not only a feasible control strategy for a single IS project manager but also an effective one. Interestingly, Figure 2 also indicates that the use of any other combination (i.e., low levels of formal and/or informal control combined with control-style ambidexterity) will lead to a decrease in IS project performance. As such, the results of our post-hoc analysis offer important implications for the successful management of IS projects. Specifically, while prior studies highlight the effectiveness of a balanced portfolio of formal and informal control modes (e.g., Kirsch 1997; Gregory & Keil, 2014), our post-hoc analysis results point to the importance of a control portfolio that balances *high* levels of formal and informal control and is enacted through the simultaneous use of contrasting control styles.

Figure 1. Interaction effects of formal/informal control and control-style ambidexterity (CSA)

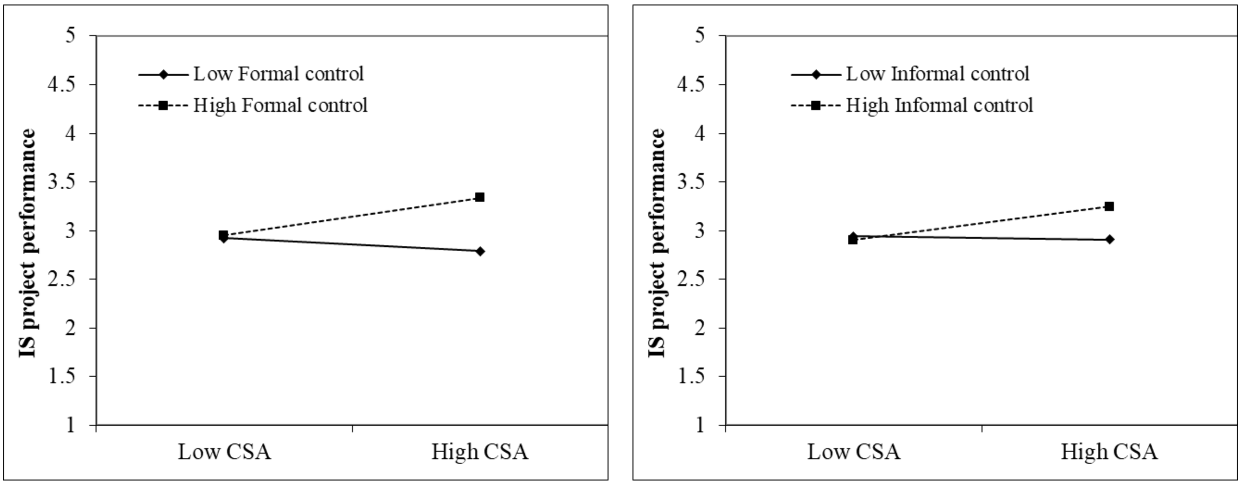
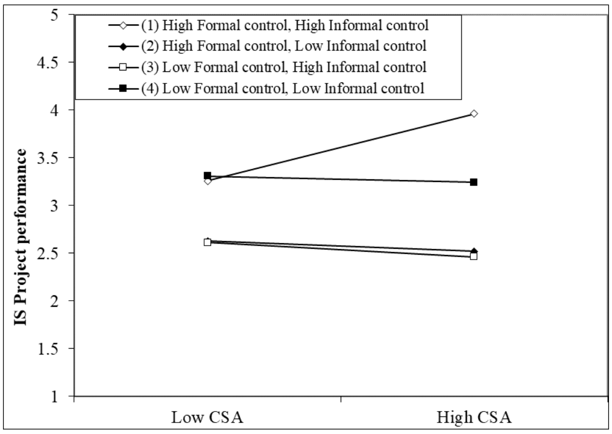


Figure 2. Three-way interaction effect of formal control, informal control, and CSA



6 DISCUSSION AND CONCLUSION

Adopting an expanded view of IS project control activities and drawing on an ambidexterity perspective, our study provides empirical evidence for the performance effects of control-style ambidexterity, as well as empirically validates the effects of control-mode ambidexterity. In particular, using matched-pair data from 146 IS projects from 146 high-tech firms, we find that the simultaneous use of directive and participative control styles (i.e., control-style ambidexterity) is positively related to IS project performance, and that control-style ambidexterity strengthens the performance effects of both formal and informal control, especially when controllers use high levels of these two control types. The results of our study contribute to the IS project control literature by offering additional support for the importance of considering control modes and control styles in combination, as well as by providing a more comprehensive understanding of effective IS project control tactics. In the following, we discuss our study's theoretical and practical implications in light of extant research along with a discussion of its limitations and related avenues for future research.

6.1 Implications for theory

First, from a conceptual standpoint, our study contributes to the IS project control literature by extending the notion of control ambidexterity proposed by Gregory and Keil (2014). More specifically, while Gregory and Keil seem to use the control ambidexterity concept primarily in relation to control modes, our study extends the scope of this concept to capture both control configuration in terms of modes (i.e., control-mode ambidexterity) and control enactment in terms of styles (i.e., control-style ambidexterity). As well, drawing on the ambidexterity literature, we conceptualize the notions of control-mode and control-style ambidexterity in terms of contextual ambidexterity (Gibson & Birkinshaw, 2004) and define them as a (single) IS project manager's simultaneous use of formal and informal control and of directive and participative control styles, respectively, in response to different contextual requirements. In doing so, our study not only acknowledges the still often-neglected multidimensionality of control activities (Gregory et al., 2013; Remus et al., 2020), but also advances our understanding regarding this multidimensionality, thereby pointing to promising avenues for future work in the research area.

Second, the results of our study contribute novel empirical insights to extant literature by being among the first studies that look into the interplay between contrasting control styles and by providing first evidence for the effectiveness of control-style ambidexterity. In particular, our results show that enacting controls through the simultaneous use of directive and participative control styles is conducive to the overall performance of IS projects. In this regard, Gregory and Keil (2014) report that the conflicting demands of IS projects in the digital era require control ambidexterity, which can be achieved by a tandem of two IS project managers who share project responsibility and use contrasting control styles (bureaucratic vs. collaborative). Our study extends and contextualizes their findings by suggesting that it is feasible for a single controller, as opposed to a tandem of two controllers, to use an ambidextrous approach to control enactment and that doing so can pay off. This empirical observation of our study finds support in earlier research, including the work by Lewis et al. (2002) who argue that in "our tough, dynamic, and demanding world, 'either/or' approaches are no longer viable" and that "today's challenges of fast change and uncertainty require 'both/and' approaches to thinking and working" (p. 547). A key argument for the superior effectiveness of such 'both/and' approaches is that contrasting control activities can complement one another (e.g., Kreutzer et al., 2016; Tiwana, 2010). This is particularly true for the digital era where project goals and team composition have been found to be increasingly diverse (Gregory et al., 2015; Wiener et al., 2019). For example, an IS project manager who relies on a single control style to enact controls may run the risk of either overemphasizing her/his formal authority (directive control style) or underemphasizing it (participative control style), which in turn can lead to unintended downstream effects such as controlee resistance or control loss (e.g., Remus et al., 2020; Wiener et al., 2016). In contrast, by combining directive and participative control styles and by subtly adapting the use of these styles to the contextual requirements of project tasks, a project manager may be able to get the 'best from both worlds.' At this point, however, it should also be noted that the simultaneous use of contrasting control styles (i.e., the adoption of control-style ambidexterity) can be expected to be anything but 'easy', since it puts high demands on both IS project managers and team members (e.g., in terms of their adaptiveness), as well as in relation to how the interaction between the controller and the controlees is conducted. As such, the concept of control-style ambidexterity might inspire future research on IS project control dynamics, and may help shed light on the characteristics that differentiate effective controllers from those that are less effective (Wiener et al. 2016).

A related contribution of our study concerns the performance effects of control-mode ambidexterity. Specifically, our analysis results show that the combination of formal and informal control has a significant and positive impact on IS project performance, which provides additional support for the findings of earlier studies (e.g., Kirsch, 1997; Choudhury & Sabherwal, 2003; Wiener et al., 2012) and also reinforces the necessity of 'both/and' (instead of 'either/or') approaches to managing IS projects (e.g., Gregory & Keil, 2014; Lewis et al., 2002).

Third, our study contributes to existing IS project control research by providing a holistic view of how control works, and in particular, by empirically examining the interaction effects between basic control types (i.e., formal and informal control) and control-style ambidexterity on IS project performance. As such, our study can be seen as a direct response to recent calls for "more attention on how both control portfolio configurations [modes] and control enactment [styles] impact the performance of IS projects" (Wiener et al., 2016, p. 767). Here, our results provide empirical support that an IS project manager's simultaneous use of directive and participative control styles to enact formal and informal control enhances IS project performance and that this performance effect is particularly pronounced when the use of control-style ambidexterity is combined with high levels of both formal and informal control. In this context, Remus et al. (2020) find that "control style is more important than control modes in explaining individual-level control effects" (p. 134). In contrast, looking into control effects at the project level, our study finds that the size of the performance effect of control-mode ambidexterity is considerably larger than the (isolated) effect of control-style ambidexterity. In addition, Remus et al. (2020) identify that higher levels of enabling control style negatively moderates the performance of formal control modes on job satisfaction. On contrary, our study investigates the interactive effects of control style ambidexterity and control modes on project level and shows positive moderating influence. Altogether, hese observations point to differing levels of importance of control modes and styles at different levels of analysis (i.e., individual controlee level vs. aggregated project level), which in turn opens interesting avenues for future research. Relatedly, by focusing on the direct performance effects of control-mode ambidexterity and control-style ambidexterity, as well as on the interactive effects between the two, our study evades the risk of a piecemeal approach (linking individual control modes, or styles, to IS project performance), which ignores key aspects of how control works. Along these lines, we hope that the expanded view of control activities adopted in this study can help reconcile inconsistent, or even contradictory, findings from earlier studies (Remus et al., 2020; Wiener et al., 2016) and support continued theory development in the area.

Last but not least, the results of our study contribute to existing IS project control literature by shedding light on contextual factors influencing the performance of IS projects. For example, our analysis results show that team heterogeneity has a significantly negative effect on IS project performance. This finding supports theoretical arguments presented in Wiener et al. (2016) who argue that cultural values, such as those related to project team members' power-distance orientation, can be expected to influence the enactment of controls and their effectiveness. Taken together, this points to potentially promising paths for future research to explore relevant context factors (e.g., cultural values and team diversity aspects) that may confine or moderate the effectiveness of ambidextrous control approaches.

6.2 Implications for practice

The results of this study also provide important implications for practitioners to enhance the effectiveness of their IS project control tactics. Generally, our results highlight that the performance benefits of contrasting control activities (i.e., formal versus informal control modes and directive versus participative control styles) are strengthened when used in combination. Hence, IS project managers should try to make use of both formal and informal control (control-mode ambidexterity), rather than focusing on either of the two in search for performance improvements. Here, an important insight gained from our study is that managers need to configure a control portfolio that carefully balances high levels of both formal and informal control, as highlighted by the results of our post-hoc analysis regarding the three-way interaction among formal control, informal control, and control-style ambidexterity.

Furthermore, our study results offer empirical support for the superior performance effects of enacting high levels of formal and informal control through control-style ambidexterity (i.e., the simultaneous use of directive and participative control styles). As well, while prior research suggests that it may be difficult for a single IS project manager to 'blend' contrasting control styles (Gregory & Keil, 2014), the results of our study indicate that it is possible to do so. This implies that organizations need to invest in training their IS project managers in order to develop and hone their ability to constantly adapt their control approach in response to the contextual requirements of different project tasks and to effectively deal with the tensions arising from the simultaneous use of directive and participative control styles. Alternatively, organizations may also want to rethink their overall approach to IS project staffing and consider assigning a tandem of two project managers (with contrasting control styles) to a single project (Gregory & Keil, 2014).

Finally, the results of our study serve as a reminder that IS project managers aiming for performance improvements need to be adaptive in terms of their control styles, rather than constantly adjusting and fine-tuning their portfolio of control modes. As such, our results reemphasize key arguments and empirical findings from earlier studies, which suggest that it is, at least, equally important to consider how controls are enacted, besides considering what controls are used (e.g., Remus et al., 2020; Wiener et al., 2016). Adding to this body of research, our results point to the performance-enhancing effects of control-style ambidexterity by providing empirical evidence that IS project managers can benefit from enacting controls through the simultaneous use of contrasting control styles, thereby enabling them to meet the often-conflicting demands of IS projects in the digital era (Gregory & Keil, 2014; Wiener et al., 2019).

6.3 Limitations and directions for future research

As with any research, the results of our study should be interpreted with several limitations in mind, which also point to promising avenues for future research. First, this study conceptualized control-style (and control-mode) ambidexterity in terms of contextual ambidexterity. Although we believe that this conceptualization is the most appropriate one in the context of our study, future studies on IS project control may want to explore other conceptualizations of ambidexterity (i.e., structural and temporal ambidexterity). For example, a structural ambidexterity perspective may lend itself to studying contrasting control tactics used in relation to a portfolio of IS projects in the context of large-scale digital transformation programs (Gregory et al., 2015). Second and relatedly, our conceptualization of control-style ambidexterity builds on the conceptual distinction between a participative control style (repair feature) and a directive control style (lack of repair); that is, our control-style conceptualization focused on only one of the two features that distinguish an enabling control style from an authoritative style (Wiener et al., 2016; Remus et al., 2020). This is also the reason for why we decided to use different labels for the two contrasting control styles examined in our study. In this regard, a promising avenue for future research would be to replicate our study based on the more comprehensive control-style conceptualization proposed in Wiener et al. (2016). For example, it might be that Wiener et al.'s second control-style feature (transparency versus lack thereof) creates additional and unique tensions that can no longer be effectively dealt with by a single IS project manager (cf. Gregory & Keil, 2014). Relatedly, given the relative novelty of the control style concept, we would like to acknowledge that more work is needed to develop measurement scales that effectively capture control enactment aspects, thereby enabling future studies to draw a clear(er) line between the configuration of control portfolios (in terms of modes) and their enactment (in terms of styles). Third, drawing on earlier studies (e.g., Gibson & Birkinshaw, 2004; Lee et al., 2015; Mom et al., 2009), we operationalized control-style ambidexterity as the multiplicative interaction of directive and participative control styles. However, other earlier studies modelled ambidexterity as a second-order construct (e.g., Benitez et al., 2017; Syed et al., 2019). For this reason, we also evaluated our structural model with an alternative operationalization of control-style ambidexterity, confirming the overall robustness of our data analysis results. Fourth and finally, the matched-pair data used in this research were collected from British high-tech firms. As such, the findings of our study might be subjected to the influence of certain characteristics of our data sample. On the other hand, we believe that our sample may actually be seen as a strength of our study, as it may provide new insights and reference points, especially since many UK high-tech firms are operating with a highly diverse workforce and have emerged as an important economy booster.

6.4 Conclusion

IS project control literature has been characterized by a strong focus on only one dimension of control activities, namely, on the configuration of control portfolios (i.e., 'what' control modes are used), as opposed to 'how' the controller interacts with the controlee to enact selected controls (i.e., control styles). Moreover, existing research has largely focused on simplistic direct effects between control modes and IS project performance, thereby neglecting the interactive effects between basic control styles ('both/and' approach), as well as between such styles and different types of control modes. This study is amongst the first ones to examine the interplay between control modes and control styles.

We expand the theory of control ambidexterity to define control-style ambidexterity as the combination of different control styles. We theoretically develop and empirically test the direct and interactive (with control modes) effect of control style ambidexterity on IS project performance. Based on the empirical insights gained from matched-pair data from 146 IS projects, our study contribute to a more comprehensive understanding of effective IS project control tactics. Such an understanding can help reconcile inconsistent, or even contradictory, findings from earlier studies, opens interesting avenues for future research, and support continued theory development in the area.

In conclusion, it is our hope that our study will encourage and inspire future research on control tactics that can help managers in effectively addressing the complex demands and novel challenges ushered in by the digital era.

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APPENDIX: MEASUREMENT MODEL EVALUATION (FIRST-ORDER CONSTRUCTS)

Table 9. Correlations among first-order constructs

	Min	Max	Mean (S.D)	1	2	3	4	5	6	7	8
1 Directive control style	1.00	5.00	3.71(0.52)	**0.728**							
2 Participative c. style	1.00	5.00	3.01(0.49)	0.382	**0.787**						
3 Input control	1.00	5.00	3.28 (0.42)	0.124	-0.139	**0.754**					
4 Behavior control	1.00	5.00	3.30 (0.56)	0.186	0.035	0.339	**0.830**				
5 Outcome control	1.00	5.00	3.41 (0.64)	0.252	0.234	0.214	0.051	**0.735**			
6 Clan control	1.00	5.00	3.32 (0.60)	0.155	0.077	-0.096	0.128	0.215	**0.830**		
7 Self-control	1.00	5.00	3.23 (0.52)	0.142	0.354	0.143	0.025	0.13	0.143	**0.806**	
8 Project performance	1.00	5.00	3.01(1.14)	0.283	0.187	0.315	-0.137	0.294	0.298	0.197	**0.774**
Note. Bold values in diagonal represent square root of AVE.											

Table 10. Cross-loadings between items and first-order constructs

Item	**DCS**	**PCS**	**INP**	**BEH**	**OUT**	**CLAN**	**SELF**	**PERF**
DCS1	0.846	0.219	0.111	0.420	0.250	0.440	0.348	0.325
DCS2	0.724	0.435	0.144	0.146	0.438	0.210	0.247	0.440
DCS3	0.765	0.218	0.026	0.247	0.337	0.321	0.111	-0.173
DCS4	0.688	0.118	0.053	0.215	0.124	0.407	0.345	0.307
PCS1	0.311	0.929	0.241	0.319	0.106	0.413	0.247	0.184
PCS2	0.458	0.981	0.347	0.205	0.205	0.233	0.415	0.165
PCS3	0.247	0.714	0.208	0.309	0.308	0.307	0.268	0.276
INP1	0.366	0.153	0.787	0.166	0.321	0.216	0.021	0.432
INP2	0.3	0.109	0.813	0.329	0.156	0.134	0.141	0.354
BEH1	0.162	0.442	0.284	0.87	0.233	0.393	0.106	0.321
BEH2	0.244	0.402	0.131	0.787	0.166	0.118	0.120	0.316
BEH3	0.296	0.160	0.479	0.949	0.137	0.354	0.419	0.236
OUT1	0.109	0.222	0.198	0.268	0.822	0.314	0.230	0.327
OUT2	0.418	0.493	0.188	0.453	0.848	0.382	0.290	0.406
OUT3	0.108	0.230	0.373	0.319	0.775	0.201	0.323	0.317
OUT4	-0.091	0.128	0.442	0.254	0.843	0.350	0.143	0.253
CLAN1	0.463	0.326	0.101	0.306	0.133	0.824	0.326	0.250
CLAN2	0.310	0.243	-0.021	0.250	0.189	0.753	0.124	0.177
CLAN3	0.381	0.365	0.012	0.181	0.270	0.874	0.232	0.082
CLAN4	0.402	0.279	0.193	0.039	0.140	0.826	0.074	0.130
CLAN5	0.214	0.063	0.044	0.351	0.268	0.788	0.069	0.296
SELF1	0.400	0.168	0.081	0.106	0.451	-0.115	0.843	0.409
SELF2	0.171	0.202	0.319	0.446	0.345	0.389	0.906	0.221
SELF3	0.425	0.428	0.013	0.339	0.271	0.226	0.853	0.330
SELF4	0.214	0.118	0.011	0.224	0.115	0.334	0.798	0.318
PERF1	0.351	0.471	0.276	0.205	0.409	0.293	0.314	0.892
PERF2	0.252	0.360	0.331	0.412	0.247	0.211	0.215	0.933

PERF3	-0.107	0.219	0.299	0.185	0.418	0.319	0.122	0.881
PERF4	0.314	0.332	0.406	-0.107	0.33	0.386	0.37	0.938

Notes: DCS = Direct control style, PCS = Participative control style, INP = Input control, BEH = Behavior control, OUT = Outcome control, CLAN = Clan control, SELF = Self-control, PERF = IS project performance.

Table 11. Heterotrait-monotrait (HTMT) ratio of construct correlations

	1	2	3	4	5	6	7	8
1 Directive control style	---							
2 Participative c. style	0.383	---						
3 Input control	0.124	0.139	---					
4 Behavior control	0.246	0.048	0.202	---				
5 Outcome control	0.252	0.234	0.214	0.051	---			
6 Clan control	0.155	0.077	0.096	0.128	0.215	---		
7 Self-control	0.142	0.354	0.143	0.025	0.13	0.143	---	
8 Project performance	0.283	0.187	0.315	0.137	0.294	0.298	0.197	---