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The Impact of Control Styles and Control Modes on Individual-Level Outcomes: A First Test of the Integrated IS Project Control Theory

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While IS development (ISD) projects are essential for deploying digital technologies in organizations, they are notoriously challenging to control and complete successfully. Prior ISD project control research mostly conceptualizes control activities in terms of formal and informal control modes and frequently focuses on performance effects at the project level. We argue that new insight can be gained by moving beyond these conventions to include control enactment as well as individual-level control effects. In this study, we present new findings that could precipitate a change in how researchers think about, and practitioners exercise, control in ISD projects. Specifically, we provide a first test of the recently proposed *Integrated IS Project Control Theory* by analysing the impacts of control modes (what) and control styles (how) on project team members' task performance and job satisfaction. Employing data from 171 ISD projects, we find significant support for this theory by confirming the positive impact of an enabling control style on both task performance and job satisfaction, and by demonstrating that control style is more important than control modes in explaining individual-level control effects. Further, the results of a post-hoc analysis suggest complex interaction effects between an enabling control style and formal controls.

Keywords: Information systems development, project control, formal control, informal control, control style, task performance, job satisfaction, theory testing.

Word count: 12 859 (total, including references and appendix)

Introduction

Information systems development (ISD) projects represent a key vehicle for introducing new digital technologies into organizational settings and implementing associated software applications (Gregory et al., 2015). An essential managerial tool for increasing the success rate of these notoriously challenging projects (Standish Group, 2013) is the exercise of control (Choudhury & Sabherwal, 2003; Kirsch, 1996). In a recent paper, Wiener, Mähring, Remus, & Saunders (2016) develop an integrated theoretical framework and present conjectures that, if supported empirically, could offer a new way forward for studies on the control of IS projects. The aim of this study is to conduct a first and critical empirical test of key aspects of this new *Integrated IS Project Control Theory*.[1] Specifically, we hone in on the potentially critical distinction between control configuration and control enactment (Wiener et al., 2016). While control configuration is about choosing the formal and informal control modes that constitute the control portfolio (*what*), control enactment is about *how* the controller interacts with the controllee to implement or promote the selected controls (cf. Kirsch & Choudhury, 2010).

Our study addresses two particularly noteworthy shortcomings of ISD project control research: First, the majority of existing studies focus on the configuration of control activities, i.e., on the question of what control modes are used in ISD projects (Wiener et al., 2016). In contrast, only a few studies go beyond the dominant control-mode framework to look at how controls are actually put into practice, or enacted (e.g., Gregory, Beck, & Keil, 2013; Heumann, Wiener, Remus, & Mähring, 2015; Tiwana & Keil, 2009). These studies suggest that a focal concept characterizing the enactment of

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[1] Edwards (2010) criticizes the practice that most theory development papers are never tested, which hinders the progress of a research field. Our study addresses exactly this problem by putting a newly developed theory under scrutiny, thus conducting the essential, but in short supply, work of empirically testing newly proposed theories.

controls is control style, which is conceptualized in terms of two contrasting styles (authoritative vs. enabling) (Wiener et al., 2016).

Second, previous studies examining control effects typically focus on the direct link between selected control modes and ISD project performance aspects (e.g., Gopal & Gosain, 2010; Keil, Rai, & Liu, 2013; Tiwana & Keil, 2009) and reveal partly inconclusive, and sometimes contradictory, results (Henry, Narayanaswamy, & Purvis, 2015; Wiener et al., 2016). One potential explanation for the inconsistent findings is that these studies, by focusing predominantly on the project level, might oversimplify the way in which controls 'work' and how they affect project performance. Specifically, we argue that the use of controls directly affects task performance at the individual controllee level, which consequently influences performance on the project level (Venkatesh, Rai, & Maruping, 2018). Prior studies also indicate that control activities can lead to negative socio-emotional side effects at the individual level, such as controllee demotivation (Cram, Brohman, & Gallupe, 2016), job dissatisfaction (Spector, 1986), and distrust (Piccoli & Ives, 2003). Such side effects are likely to lead to diminished task performance at the individual level, which in turn will hamper ISD project performance. For example, Beecham, Baddoo, Hall, Robinson, & Sharp (2008) find that when software developers perceive enacted controls (e.g., project-internal reward systems) as unfair and/or unrealistic, they become demotivated, which consequently negatively affects the overall performance of ISD projects.

Specifically, our study aims to answer the following research question: *To what extent do (formal and informal) control modes and control styles impact the task performance and job satisfaction of ISD project team members?* In other words, our study compares the effects of control modes and control styles in terms of how well each explains control effects at the individual level. To the best of our knowledge, our study is among the first in IS to quantitatively examine the control style concept and its effect on individual-level outcomes, thereby enabling a comparison between control modes and control styles, as well as an exploration into the interplay between the two.

To answer our research question, we conducted an online survey with project team members from 171 ISD projects and used partial least squares (PLS) path modelling to analyse the collected data. The results show that control style (*how*) is a stronger predictor of individual task performance and job satisfaction than control modes (*what*). The main contribution of our study thus lies in providing empirical support for the importance of considering control enactment (style) in combination with control configuration (modes) to better understand the effectiveness of ISD project control activities. Through this, our study provides explicit support in a crucial first test of the *Integrated IS Project Control Theory*.

Theoretical Background

ISD Project Control

Prior studies have shown that controlling ISD projects is a challenging task (e.g., Kirsch, 2004; Mähring & Keil, 2008). In line with earlier ISD project control studies (e.g., Kirsch, 1996; Kirsch, 1997; Choudhury & Sabherwal, 2003) and related studies in contributing disciplines (e.g., Jaworski, 1988; Ouchi, 1979), our study defines control as any attempt to ensure that individuals working on a project act in a manner consistent with organizational goals. In this behavioural view of control, a typical control situation is seen as dyadic, as there is a controller who exercises control over a controllee, or group of controllees (Choudhury & Sabherwal, 2003). To influence the controllee's behaviour and align it with organizational goals, the controller carries out specific control activities, which can be conceptualized in terms of control modes and control styles (Wiener et al., 2016).

Control Modes & Control Styles

The great majority of ISD project control studies conceptualizes control activities in terms of different control modes (Henderson & Lee, 1992; Kirsch, 1996, 1997, 2004), typically divided into formal (input, behaviour, and outcome control) and informal (clan and self-control) modes. Formal control refers to modes that “rely on mechanisms that influence the controllee’s behaviour through performance evaluation and rewards” (Choudhury & Sabherwal, 2003, p. 2), whereas informal control refers to modes that rely on control mechanisms “that utilize social or people strategies to reduce goal differences between controller and controllee” (ibid, p. 2). Input control is a formal control mode that includes resource allocation decisions and the selection and training of project team members (Gill, 2019; Jaworski, 1988; Wiener et al., 2016). Behaviour control, or process control (Ouchi & Maguire, 1975), concerns specifying work processes and monitoring controllee adherence to these processes (Kirsch, 1996). Outcome control is about reinforcing controllee behaviours by measuring actual outcomes and comparing them with desired outcomes (Ouchi & Maguire, 1975), regardless of how the results were produced (Kirsch, Sambamurthy, Ko, & Purvis, 2002). Clan control (Jaworski, 1988; Ouchi, 1979) is an informal control mode, which emphasizes the identification and reinforcement of “acceptable behaviours through shared experiences, rituals, and ceremonies” (Basnet & Lane, 2005, p. 3). In self-control, the specific goals and behaviours to achieve these goals are set by the controllee (Henderson & Lee, 1992; Kirsch, 1997). This informal control mode thus refers to self-management (Kirsch, 1996). Controllers combine formal and informal control modes into a control portfolio (Choudhury & Sabherwal, 2003; Kirsch, 1997).

While viewing control activities with the control-mode lens has provided valuable insights into control approaches used in ISD projects and their effectiveness (Henry et al., 2015), Wiener et al. (2016) argue that this lens considers only one dimension of control activities (*what*), thus neglecting the multidimensionality of such activities (e.g., Gregory et al., 2013; Kirsch, 2004; Snell, 1992). Specifically, the control-mode lens neglects *how* controls are enacted through the interactions between controller and controllee. Drawing on related research (Adler & Borys, 1996) and key ISD project control studies (e.g., Gregory et al., 2013), Wiener et al. (2016) employ a distinction between two contrasting control styles, authoritative and enabling, which are viewed as end points on a continuum. In the *Integrated IS Project Control Theory* (illustrated in Figure 1), these two control styles, in combination with control modes, lead to control consequences at the individual level (and ultimately at the project level).

An enabling control style involves frequent controller-controllee interactions (Gregory & Keil, 2014), promotes regular feedback cycles (Gregory et al., 2013), and allows the controllee flexibility to deal with real-work contingencies (Adler & Borys, 1996). In contrast, in an authoritative control style (also referred to below as low enabling control style), controls are designed to ensure and, if necessary, enforce compliant controllee behaviour and goal-directed effort. Such a control style relies on bureaucratic values and represents a top-down control approach (Adler & Borys, 1996) that typically allows the controllee little or no influence over how control is configured and enacted (Gregory et al., 2013; Gregory & Keil, 2014). For example, when using an enabling control style, the project manager would first discuss the planned use of an agile ISD method, such as Scrum, with team members and provide relevant context information about the rationale and intended benefits of using this method (Wiener et al., 2016). In contrast, in an authoritative control style, the project manager would unilaterally mandate the use of Scrum and require project team members to adhere to the method. Here, an important conceptual assumption of Wiener et al.'s (2016) *Integrated IS Project Control Theory* is that the distinction between authoritative and enabling control styles also applies to the enactment of informal controls. For instance, with regard to self-control, they provide the example of a controller 'foisting off' a work task on the controllee (authoritative style), as opposed to the controller discussing her expectations with the controllee and collecting feedback before assigning the work task (enabling style). Also, Wiener et al. (2016) highlight that, in practice, it is likely that the control style is based on a dominant choice rather than an absolute one. Thus, in most cases it is possible to assess whether a controller uses a more enabling or a less enabling (i.e., more authoritative) control style.

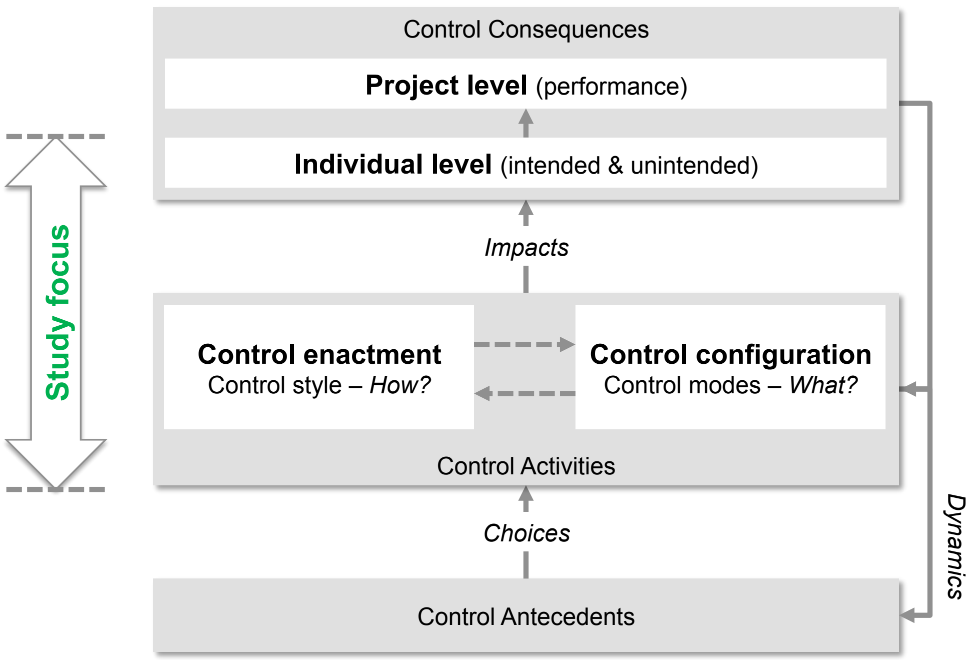

Figure 1. Integrated IS Project Control Theory (adapted from Wiener et al., 2016)

Two core features, or design principles, characterize an enabling control style: repair and transparency (Adler & Borys, 1996; Wiener et al., 2016). Repair as a design principle anticipates breakdowns in control activities and provides capabilities for fixing them. For example, an enabling control style appreciates controllee feedback on real-work contingencies and allows for deviations from controller instructions when necessary (Adler & Borys, 1996). In contrast, an authoritative control style typically sees deviations from controller prescriptions as negative and to be minimized. The second core feature of an enabling control style, transparency, is concerned with the visibility of control and other project activities (internal transparency) and the visibility of the overall project context (global transparency). For example, in the enabling logic, the controller provides controllees with the underlying rationale for the controls employed, offers regular performance feedback, and explains how individual project tasks fit into the 'bigger picture' (Adler & Borys, 1996). In contrast, with an authoritative control style, controls are enacted as assertions regulating controllee behaviours.

The conceptual distinction between authoritative and enabling control styles (Wiener et al., 2016) shows parallels with the distinction between interactive and diagnostic uses of management control systems, discussed in the management accounting literature (e.g., Bisbe & Otley, 2004; Simons, 1991) and elsewhere (Sakka, Barki, & Côté, 2016).[2] Diagnostic control use is driven by output assessments, identifies and treats issues after they occur, and focuses on corrective control interventions (Sakka, Barki, & Côté, 2013), whereas interactive control use is characterized by regular management interventions in decision processes, and focuses on learning and dealing with uncertainty (Sakka, et al., 2013; Simons, 1991). However, there are also some key differences between these two conceptual distinctions: The concepts of

[2] We thank an anonymous reviewer for drawing our attention to this interesting parallel.

interactive and diagnostic control uses were specifically developed in relation to management control systems, which are defined as formalized systems of routines and procedures that use information to maintain or alter organisational patterns (Simons, 1991). As such, these systems focus on formal (and not informal) control aspects, including information-based control processes for planning, budgeting, and performance evaluations (Simons, 1991). In comparison, the concepts of authoritative and enabling control styles are 'broader' in the sense that they encompass not only the informational, but also the social/informal qualities of controller-controllee interactions (Wiener et al., 2016), which makes these concepts applicable also to informal controls. Control style can thus be seen as a mode of thinking that drives a manager's control actions (Lewis et al., 2002), which contrasts the focus on formalized information-based control processes typically characterizing management control systems (Simons, 1991).

Although some recent ISD project control studies point to the importance of considering the applied control style together with the used control modes (Wiener et al., 2016), empirical studies on this topic remain scarce. One notable exception is the study by Heumann et al. (2015), which finds that senior and ISD project managers differ in their use of control style but not in their use of control modes. Relatedly, prior studies investigate control-balancing processes including dynamics in control styles (Gregory et al., 2013), tensions between contrasting control styles (Gregory & Keil, 2014), and the performance effects of diagnostic and interactive control uses in IS projects under different levels of task uncertainty (Sakka et al., 2013). Still, these studies have in common that they fail to more deeply investigate the effectiveness and explanatory power of control styles, especially in comparison to control modes, and their focus is on project-level outcomes instead of individual-level effects. Also, given that most prior studies are case study-based, our (quantitative) survey-based study can help extend the empirical basis for generalizability claims (cf. Cardinal, Kreutzer, & Miller, 2017).

Control Effects at the Individual Level

Extant research on control effectiveness exhibits a strong focus on the effects of control modes on ISD project performance in general (e.g., Henry et al., 2015; Tiwana & Keil, 2009), as well as on specific performance dimensions such as project cost and quality (e.g., Gopal & Gosain, 2010). This research offers empirical support for the performance-enhancing effects of formal and informal controls (e.g., Henderson & Lee, 1992; Keil et al., 2013; Tiwana & Keil, 2009), but has also produced several inconclusive or even contradictory results (Henry et al., 2015; Wiener et al., 2016). These mixed results can be explained by a key shortcoming in previous research: the implicit assumption that control activities that are enacted at the level of the individual controller and controllee have a direct effect on performance at the project level.

Consequently, existing ISD project control research has almost exclusively focused on project-level (performance) effects, thereby potentially oversimplifying our understanding of how control 'works.' In this context, we argue that the impact of control activities on ISD project performance results from control effects at the individual controllee level (Venkatesh et al., 2018). This is in line with Basnet & Lane (2005) who stress that every project is "an assortment of individuals where each individual contribution to the project is summated" (p. 4). Relatedly, the results of a meta-study on organisational control by Cardinal et al. (2017) indicate that, even though control studies in the management and organisational behaviour literatures do consider individual-level outcomes, there is a lack of studies on human-relations outcomes (such as job satisfaction) important for individuals' work-life balance and organizations' competitiveness (ibid).

Thus, our study focuses on how ISD project control activities affect individual ISD project team members' task performance and job satisfaction. Task performance refers to "the proficiency with which individuals perform the core substantive or technical tasks to [their] job" (Campbell, 1990, pp. 708-709). Measuring individuals' performance in project teams (Koopmans et al., 2013), task performance can be seen as the source of (overall) project performance (Basnet & Lane, 2005). Job satisfaction is defined as "the extent of positive emotional response to the job resulting from an employee's appraisal of the job as fulfilling or congruent with the individual's values" (Morris & Venkatesh, 2010, p. 145).

In the following, we develop a research model consisting of three hypotheses relating the use of formal controls, informal controls, and enabling control style to the controllee's task performance and job satisfaction in ISD projects, thereby testing key aspects of the *Integrated IS Project Control Theory* (Wiener et al., 2016). Including control modes and control styles in the same research model also enables us to compare their relative explanatory power.

Research Model and Hypotheses

Formal-Control Effects at the Individual Level

The complex and non-routine nature of ISD projects is closely related to task ambiguity and uncertainty (Wiener et al., 2016). Here, the controller's use of formal controls provides the controllee with a required level of guidance and structure, which facilitates the execution of ISD project tasks and, consequently, can be expected to result in improved task performance. For example, formal behaviour controls can structure the controllee's work tasks by defining the sequence of work steps (Kirsch et al., 2002), or by offering proven work techniques (Cram & Brohman, 2013). In other words, by specifying formal rules and procedures, the controller can assist the controllee in making task execution more efficient and effective (cf. Gopal & Gosain, 2010). Another example is the use of formal controls to clearly specify the intended outputs of assigned tasks, enabling the controllee to set the 'right' priorities. In contrast, failing to do so risks task ambiguities (Jaworski, Stathakopoulos, & Krishnan, 1993) and inefficiencies (Gopal & Gosain, 2010), which will decrease the controllee's task performance. Further, by manipulating the human, financial, and material resources of an ISD project (input control), the controller can intentionally create a project environment in which the controllee can thrive (Mähring, 2002). For instance, ensuring that the controllee possesses the knowledge to perform a given ISD project task (e.g., through careful team member selection and/or task-specific training) increases the chances of high task performance.

Although the use of formal controls provides the controllee with guidance and structure conducive to her task performance, formal controls are also often perceived as stifling by professionals (Cardinal et al., 2017). For example, Fitzgerald (1996) argues that even though the use of formalized ISD project methodologies provides an increased level of control, it may also stifle the creativity, intuition, and learning of software developers. These unintended consequences may negatively affect controllees' job satisfaction, especially if they believe that they have the knowledge and expertise needed to execute the assigned project task(s). For example, prior studies find that an overemphasis on work formalization and the resulting lack of work autonomy decrease ISD professionals' job satisfaction, eventually contributing to increased absenteeism and turnover intentions (e.g., Beecham et al., 2008). Further, related research in non-ISD contexts finds that job control is positively associated with job satisfaction, suggesting that formal control, which imposes limits on controllee choices, is negatively related to job satisfaction (Bond & Bunce, 2003).

Here, it should be noted that some studies find a more nuanced link between formal controls and job satisfaction (e.g., Lu, While, & Barriball, 2005). For example, ISD project task attributes, such as its ambiguity or complexity, may create situations in which greater use of formal controls would be appreciated by controllees and increase their job satisfaction. However, although arguments can be made in either direction, prior research on the whole offers more extensive and compelling support for a negative relationship between formal controls and job satisfaction. We thus suggest:

H1: While greater use of formal controls (a) positively affects the controllee's task performance, it (b) negatively affects the controllee's job satisfaction in ISD projects.

Informal-Control Effects at the Individual Level

In contrast to formal controls, informal controls are more implicit in nature. Relying on socialization and people strategies (Tiwana & Keil, 2009; Wiener, Remus, Heumann, & Mähring, 2015), they can potentially reduce goal differences between the controller and controllee (Choudhury & Sabherwal, 2003). Prior research points to the crucial role and performance-enhancing effects of informal controls in the context of ISD projects (Chua, Lim, Soh, & Sia, 2012; Tiwana & Keil, 2009). For example, by promoting a collaborative team culture (clan control), the controller creates a project environment that encourages the controllee to openly share and discuss ideas, issues, and questions (Gopal & Gosain, 2010), thus leading to better task performance (cf. Chua et al., 2012; Kirsch, 2004; Kirsch et al., 2002). A collaborative culture also motivates the controllee to be more open to expose work outcomes to scrutiny by the controller, increasing communication quality and speed, which consequently leads to fewer errors (Gopal & Gosain, 2010; Gopal, Konduru, Mayuram, & Mukhopadhyay 2003). It also facilitates developing a shared understanding of how to accomplish interdependent tasks, a common challenge in ISD projects (Wiener et al., 2015). Further, a collaborative culture results in social cohesion, which is likely to facilitate quick resolution of disputes that would otherwise hamper task performance (Chua et al., 2012). Relatedly, the controller's use of informal controls provides the controllee with autonomy in managing assigned project tasks (Heumann, Wiener, & Remus, 2012). For example, when exercising self-control, the controllee herself determines task goals and appropriate actions, and monitors their achievement (Kirsch et al., 2002). A certain degree of autonomy also improves the quality of task outcomes by enabling controllees to leverage their (superior) ISD knowledge and expertise in accomplishing project tasks (Henderson & Lee, 1992; Kirsch et al., 2002; Tiwana & Keil, 2009).

The autonomy and social cohesion often associated with the use of informal controls can increase the controllee's task performance and job satisfaction (Loher, Noe, Moeller, & Fitzgerald, 1985; Spector, 1986). For example, existing studies suggest that as controllers shift from hierarchical (e.g., formal) controls to decentralized (e.g., informal) controls, the controllee's job satisfaction increases (Jaworski et al., 1993). Prior literature offers several explanations for the positive link between informal controls and job satisfaction: Informal controls provide the controllee with high levels of autonomy, flexibility, and discretion in achieving work outcomes, all strong determinants of job satisfaction. The use of informal controls also reduces bureaucratic pressure and stimulates collegial behaviours, which result in a sense of trust and belonging, all important antecedents of job satisfaction (Agarwal & Ramaswami, 1993). Additionally, informal controls can engage the controllee emotionally and provide her with a sense of purpose (O'Reilly & Chatman, 1996). Also, the use of informal controls may encourage the controllee to share and discuss her work with the controller and coworkers (Gopal & Gosain, 2010; Gopal et al., 2003), allowing her to receive appreciation and recognition. Similarly, facilitating quick conflict resolution through social cohesion (Chua et al., 2012), the controller's use of informal controls does not only contribute to increased task performance but also increased job satisfaction (Gill, 2019). Based on these arguments, we hypothesize:

H2: Greater use of informal controls positively affects (a) the controllee's task performance and (b) the controllee's job satisfaction in ISD projects.

Control-Style Effects at the Individual Level

As noted above, the two main features that characterize an enabling control style are repair and transparency. By inviting feedback on enacted controls, the repair feature involves the controllee in control processes, resulting in a better individual-work fit (Seibert, Wang, & Courtright, 2011). Further, the repair feature allows the controllee to deviate from controller prescriptions, if needed to respond to real-work contingencies (Wiener et al., 2016). Consequently, unexpected problems that arise during task execution can be fixed faster and arguably more effectively by the controllee without the controller's involvement. Similarly, the transparency feature enables the controllee to respond to unforeseen contingencies and emerging issues (Ahrens & Chapman, 2004). For example, when using an enabling control style, the controller provides the controllee with context information that may be relevant to the successful execution of ISD project tasks. As well, the transparency feature includes the provision of regular feedback on the controllee's performance, encouraging the controllee to continue or adjust her efforts (Adler & Borys, 1996).

Additionally, the repair and transparency features of an enabling control style require close controller-controllee interaction, thereby fostering knowledge integration

(Tiwana, 2008) and controllee learning (Adler & Borys, 1996)—two key antecedents of task performance. In contrast, the use of a less enabling (i.e., more authoritative) control style is likely to hinder knowledge integration and learning, mainly because of the lack of information exchange and continuous feedback (Adler & Borys, 1996). An example is provided in Choudhury and Sabherwal (2003) who report on two ISD projects, in which client firms 'forced' the vendor to design the requested software system with minimal involvement by the client's IT department, although the vendor lacked a solid understanding of the clients' business domains. In both cases, "the vendors were unable to do an effective job of design, which later caused multiple problems" (pp. 311-312).

Beyond having a positive effect on task performance, we also suggest that the key features of an enabling control style (repair and transparency) positively affect the controllee's job satisfaction. For example, by allowing the controllee to deviate from standard operating procedures (repair) and providing her with information about the project environment (transparency), both features work towards granting autonomy and empowering the controllee (Adler & Borys, 1996). An empowered controllee who sees and understands the 'bigger picture' is more likely to feel committed and motivated, and less likely to show resistance (Lawrence & Robinson, 2007). Also, an empowered controllee perceives herself as being authorized to think, behave, and act in a largely autonomous manner. Such perceptions help ease role stress (Adler & Borys, 1996), and are thus positively related to job satisfaction (e.g., Seibert et al., 2011). This is consistent with Fang, Evans, & Zou (2005) who find that employees who participate in decision-making not only have a better understanding of how to execute tasks, but also exhibit a higher level of job satisfaction. Relatedly, in the enabling logic, the controller considers breakdowns and repairs to be opportunities for improvement (Adler & Borys, 1996). For instance, Ahrens & Chapman (2004) find that "the premise of the enabling logic is that operations are not totally programmable" (p. 279), which is particularly true for ISD projects. Hence, the repair feature of an enabling control style is favourable since it actively encourages the controllee to discuss practical problems with standard task procedures and rules (ibid), and naturally stimulates her commitment and performance. In contrast, being characterized by a lack of repair and transparency, the use of a more authoritative control style reduces controllee autonomy and may thus lead to unintended consequences, such as controllee resistance and lack of commitment (Gregory & Keil, 2014). Also, by limiting the controllee's understanding of relevant project processes, a less enabling control style is more likely to result in ambiguous role expectations, which are related to dysfunctional behaviour and controllee dissatisfaction (e.g., Rizzo, House, & Lirtzman, 1970). Therefore, we propose:

H3: Greater use of an enabling control style positively affects (a) the controllee's task performance and (b) the controllee's job satisfaction in ISD projects.

Our research model including the hypothesized relationships is illustrated in Figure 2. Please note that the positive link between job satisfaction and task performance is well established in prior literature (Judge et al., 2001). We therefore decided to not include this link in our model.

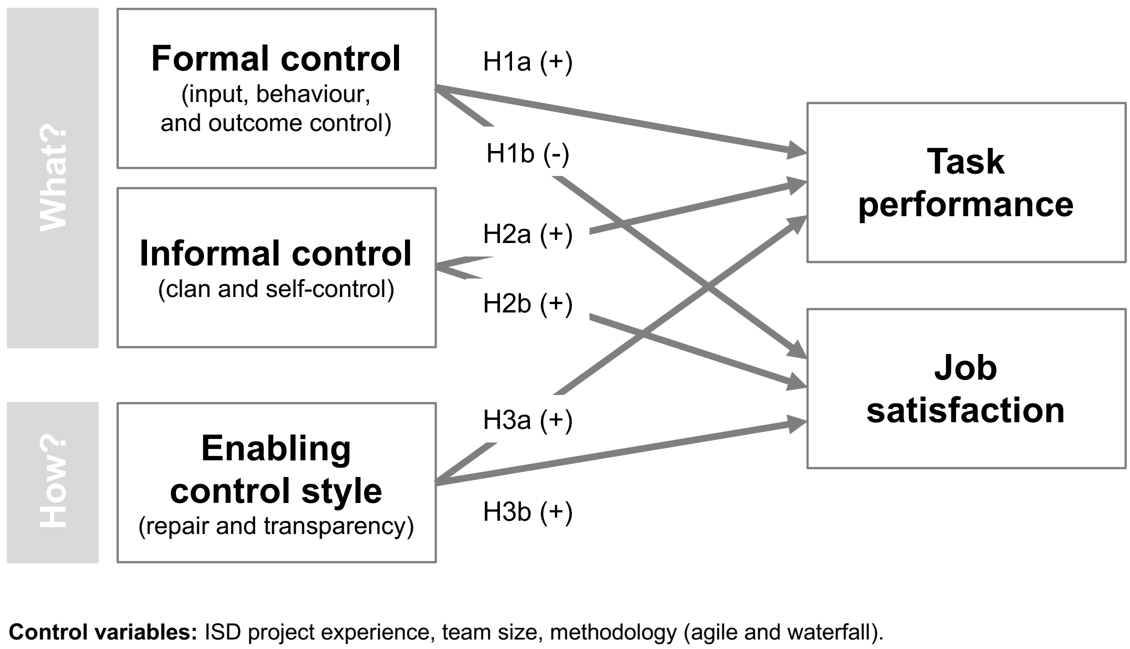

Figure 2. Research Model

Research Methodology

Data Collection

We developed a survey instrument using the online survey tool *Sosci-Survey*. In the period fall 2014 – spring 2017, we invited a total of 544 contacts at Austrian companies engaged in ISD projects to participate in our study. The use of this "known-sponsor-approach" helped establish immediate legitimacy and credibility of the research team and study (Patton, 1990). In total, team members from 171 ISD projects completed the survey, which corresponds to a response rate of 31.4%. Our data set covers a broad range of ISD projects and a diverse set of ISD project team members (see Table 1).

Table 1. Descriptive Statistics on Data Sample

ISD projects					
Project sourcing type	Internal (67.8%)	Outsourcing (including near-/offshoring) (32.2%)			
ISD methodology	Waterfall (22.2%)	Agile (23.4%)	Rapid (14.6%)	Spiral (9.4%)	Other (30.4%)
Project team size	< 5 members (23.4%)	5-10 members (33.3%)	11-20 members (22.2%)	> 20 members (21.1%)	
Project volume	< 100k € (26.3%)	100k – 250k € (24.0%)	251k – 500k € (17.0%)	501k – 1m € (17.5%)	> 1m € (15.2%)
Project duration	< 1 year (38.0%)	1-2 years (26.9%)	2-3 years (17.6%)	3-4 years (6.4%)	> 4 years (11.1%)
ISD project team members					
Age	< 25 years (9.9%)	25-35 years (25.7%)	36-44 years (33.3%)	> 45 years (30.4%)	No answer (0.7%)
Gender	Male (78.4%)	Female (21.6%)			
ISD project experience	< 1 year (9.9%)	1-3 years (17.6%)	3-5 years (12.9%)	> 5 years (59.6%)	
Note: N = 171 ISD projects (and team members).					

Beside project and personal information, the survey questionnaire asked participants to provide information on how the ISD project manager controlled them, how they perceived their individual (task) performance in the project, and how satisfied they were with working on the project. The way in which we introduced and presented the survey questions ensured that respondents referred to just one and always the same ISD project. Moreover, the questionnaire was set up in a way that survey respondents had to rate every item. We deliberately chose ISD project team members (controllees) as respondents, since only controllees can assess individual socio-emotional variables such as job satisfaction. Also, they are well suited to report on the control activities executed by the controller.

Construct Measures

In line with Keil et al. (2013), we modelled formal control and informal control as multidimensional, second-order constructs in a reflective-formative type (Hair, Hult, Ringle, & Sarstedt, 2014), which included the corresponding control modes as first-order constructs. Measures for input, behaviour, and outcome control (formal control), as well as for clan and self-control (informal control), were derived from key control studies (Brief & Aldag, 1981; Kirsch, 1996; Kirsch et al., 2002; Snell, 1992; Tiwana & Keil, 2009; Yu & To, 2011) and adapted to the specific context of our study.

We also measured enabling control style as a reflective-formative second-order construct. To do so, we developed a new multidimensional measurement instrument, following Hinkin's (1998) deductive item-generation approach. More specifically, we first derived an initial set of items based on the distinguishing features of an enabling control style: repair and transparency (Adler & Borys, 1996; Wiener et al., 2016). We then evaluated and refined these items by means of iterative rating exercises with 34 students enrolled in an ISD project management class, followed by face-to-face interviews and two online surveys with ISD professionals. This resulted in a final set of 13 items (five related to the repair feature and eight related to the transparency feature of an enabling control style).

Concerning the two dependent variables of our research model, we used items from Carillo (2014) and Koopmans et al. (2014) to measure task performance and adopted items from Weiss, Dawis, England, & Lofquist (1967) to measure job satisfaction. Since survey respondents were asked to assess their own task performance, our measurement approach refers to self-perceived task performance. All latent variables were measured with multiple items on 5-point Likert scales (from 'strongly disagree' to 'strongly agree') and operationalized at the individual level. An overview of all construct measures is provided in Appendix A.

Measurement Model

We used *SmartPLS 3* (Ringle, Wende, & Becker, 2015) to transform our research model into a structural equation model (SEM). As recommended by Hair, Ringle, & Sarstedt (2011), we assessed the measurement model using the partial least squares (PLS) path-weighting scheme with 1,000 iterations (and the structural model with a bootstrap size of 5,000 subsamples). We employed PLS path modelling because it is a predictive analysis technique (e.g., Hair et al., 2011; Ringle, Sarstedt, & Straub, 2012) that is remarkably stable even if the sample size is limited (Gefen, Rigdon, & Straub, 2011). Further, the PLS estimation method can handle second-order constructs of a reflective-formative type and produces precise estimates in situations when data are not normally distributed (Ringle et al., 2012). (Note: The Kolmogorov-Smirnov test suggested that non-normal distribution cannot be ruled out for most of our study constructs.)

All first-order constructs were measured reflectively. To assess item reliability, we followed established guidelines (Becker, Klein, & Wetzels, 2012; Hair et al., 2014). On this basis, we dropped several items (see Appendix A). All remaining items have outer loadings of at least 0.6 (Chin, 1998; Hair, Black, Babin, & Anderson, 2010) and all second-order constructs have an equal number of items across dimensions (Becker et al., 2012). Composite reliability (CR) and average variance extracted (AVE) of all constructs exceed the suggested thresholds of 0.7 and 0.5, respectively, indicating construct reliability and convergent validity (Fornell & Larcker, 1981). Also, for each construct, the AVE is greater than the highest squared correlation with any other construct (see Table 4 in Appendix B) and item loadings are greater than cross loadings, establishing discriminant validity.

The three second-order constructs (formal and informal control and enabling control style) were assessed according to Mackenzie, Podsakoff, & Podsakoff's (2011) instructions for superordinate constructs. First, to assess construct validity, we manually calculated the adequacy coefficient R^2_a for the second-order constructs (Edwards, 2001). For each construct, the coefficient exceeds the threshold of 0.5 (see Table 4 in Appendix B), which means that, on average, the majority of the variance in the first-order constructs is shared with the second-order construct (Mackenzie et al., 2011). Further, heterotrait-monotrait ratio (HTMT) values for all constructs are below 0.90, establishing discriminant validity (Henseler, Ringle, & Sarstedt, 2015) (see Table 5 in Appendix B). Second, we examined the validity of each individual sub-dimension (Mackenzie et al., 2011). All formative indicator weights are significant, indicating that the higher-order constructs are explained by the lower-order constructs (Schmiedel, vom Brocke, & Recker, 2014).

To assess the strength of construct intercorrelations, we also conducted a full-collinearity test by calculating the variance inflation factor (VIF) values for all dependent, independent, and control variables included in our research model (Kock & Lynn, 2012). All VIF values are clearly below the most conservative threshold of 3.3 (ibid), with enabling control style showing the highest VIF value (2.155). We therefore found no indications of multicollinearity issues.

Since our data was self-reported from a single source, common method bias (CMB) is a potential concern. To control for CMB, we used procedural remedies (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). These included defining ambiguous or unfamiliar terms and keeping questions simple and concise. Further, we avoided using vague concepts and double-barrelled questions. Additionally, as a post-hoc test of CMB, we conducted Harman's single-factor test (Podsakoff et al., 2003). Neither did a single factor emerge from an exploratory factor analysis, nor did one general factor account for more than 50% of the total variance. (One factor explained at most 16.9% of the variance in the data.). As noted above, we also performed a full-collinearity test, which is considered a strong and conservative alternative for the identification of CMB (Kock, 2015). Altogether, we can safely assume that CMB is not an issue in our study.

In addition, we used a mix of a-priori and post-hoc strategies to account for non-response bias (Sivo, Saunders, Chang, & Jiang, 2006). For example, we compared key demographic characteristics of the survey respondents with those of the overall target population (Sivo et al., 2006) and found that the average age and gender distribution of our sample closely matches those from official statistics on IT professionals in Austria.

Finally, to test for alternative explanations, we included four control variables in our research model: ISD project experience, ISD project team size, and two dummy variables (agile and waterfall methodology). These variables have been found to be theoretically related to job satisfaction and task performance (e.g., Adler & Borys, 1996; Tripp, Riemenschneider, & Thatcher, 2016).

Data Analysis & Results

To test our research hypotheses, we included all predictor (formal control, informal control, enabling control style) and dependent (task performance and job satisfaction) variables in one model. In addition to calculating effect sizes, we ran an importance-performance matrix analysis (IPMA; see below) to assess the relative importance and performance of the predictor constructs (Hair et al., 2014).

The hypotheses test results are summarized in Table 2. H1 and H2 refer to the use of formal controls and informal controls, respectively, and their relationship with the controllee's task performance and job satisfaction. The analysis results did not reveal significant relationships with regard to H1a, H2a, and H2b. Interestingly, while H1b suggests a negative link between formal controls and job satisfaction, the results indicate the opposite; that is, a significantly positive link. Thus, H1b is not supported.

H3a and H3b pertain to the effects of an enabling control style on task performance and job satisfaction, respectively. Both hypotheses are supported by the analysis results. The four control variables did not show any significant relationships.

Table 2. Control Effects on Task Performance and Job Satisfaction

	Task Performance			**Job Satisfaction**		
Construct	*ß*	*t-value*	*f^2*	*ß*	*t-value*	*f^2*
Project experience	0.021	0.318	0.000	-0.131	1.778	0.018
Project team size	-0.013	0.176	0.000	-0.045	0.612	0.002
Agile methodology	0.013	0.236	0.000	-0.032	0.448	0.001
Waterfall methodology	-0.048	0.635	0.003	0.059	0.903	0.004
Formal control (H1)	0.121	1.759	0.017	**0.277***	**3.549**	**0.086**
Informal control (H2)	0.098	1.091	0.010	0.072	0.778	0.005
Enabling control style (H3)	**0.449***	**4.725**	**0.165**	**0.389***	**4.460**	**0.122**
R^2 / R^2 adjusted (%)	30.5 / 27.5			29.3 / 26.2		
Notes: Significant effects in boldface. * p < 0.05, ** p < 0.01, *** p < 0.001; two-tailed test.						

With regard to effect sizes, f^2 values from 0.02, 0.15, and 0.35 signify small, moderate, and large effects, respectively (Cohen, 1988). While formal control shows a small effect on job satisfaction ($f^2 = 0.086$), enabling control style has a moderate effect on task performance ($f^2 = 0.165$) and a small effect on job satisfaction ($f^2 = 0.122$) (see also Table 2).

In addition to the ‘full’ model shown above, we also calculated a model, which considered only the effects of formal and informal control (i.e., excluding enabling control style). This ‘control-modes-only’ model shows significant effects of both formal and informal control (see Table 6 in Appendix C). Interestingly, all of these significant effects disappear, except for the positive effect of formal control on job satisfaction, when the ‘full’ model is considered (see Table 2 above). This finding indicates a strong absorbing effect of an enabling control style and emphasizes the important role that control style plays in predicting the impact of control activities at the individual level.

Furthermore, comparing the explained variance (R^2) of the two models provides additional support for the importance of considering control style. In particular, while the ‘control modes-only’ model accounts for about 19% and 21% of the variance in task performance and job satisfaction, respectively, the ‘full’ model accounts for about 31% and 29% of the variance.[3] Moreover, to account for the potential influence of different ISD project-sourcing types on control effectiveness (Tiwana & Keil, 2009), we split our dataset into internal projects (n = 116) and outsourced projects (n = 55) and then reanalysed our research model using the multi-group analysis (MGA) feature of *SmartPLS*. The MGA results largely confirmed the main-analysis results and did not point to any statistically significant differences across internal and outsourced projects.

Importance-Performance Matrix Analysis (IPMA)

As indicated above, we performed an IPMA to assess the total effects (“importance”) of formal control, informal control, and enabling control style in relation to their average use (“performance”) in ISD projects. (Hair et al., 2014). The latter is measured based on the predictor’s average scores, which are only available in PLS but not in covariance-based SEM (Völckner, Sattler, Hennig-Thurau, & Ringle, 2010). Figure 3 shows that an enabling control style has the highest IPMA importance scores for both individual task performance and job satisfaction. These scores further emphasize the critical role that the project manager’s control style plays in ISD projects. For example, the IPMA results suggest that if the performance (average use) of an enabling control style was increased by one unit, the controllee’s job satisfaction would increase by the corresponding importance value (0.389) (Table 3). In contrast, the low importance scores of informal

[3] To avoid a bias toward complex models, we also computed the adjusted R^2 (Hair et al., 2014). As anticipated, the adjusted R^2 values are slightly lower for both models.

controls suggest that increased use of such controls would have only a marginal effect on task performance and job satisfaction.

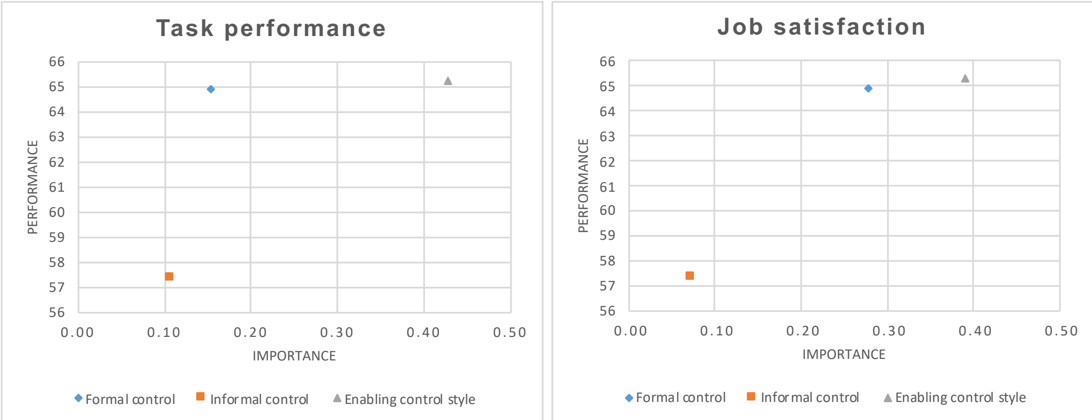

Figure 3. IPMA Scores (Task Performance and Job Satisfaction)

Table 3. Importance-Performance Matrix Analysis (IPMA) Scores

Scores	**Importance**		**Performance**
Construct	Task performance	Job satisfaction	
Formal control	0.152	0.277	64.922
Informal control	0.107	0.072	57.373
Enabling control style	0.427	0.389	65.262

Further, the moderate IPMA performance scores of an enabling control style indicate that there still is room for managerial action (Schloderer, Sarstedt, & Ringle, 2014). The same applies to formal controls, making them another potential candidate for managerial action, at least for job satisfaction. In summary, the IPMA results confirm and extend the PLS analysis results and indicate that ISD project managers should primarily focus on the use of an enabling control style (and formal controls) to improve the controllee's task performance and job satisfaction.

Post-Hoc Analysis: Interaction Between Control Modes and Styles

The main-analysis and IPMA results suggest that the individual controllee's task performance and job satisfaction are attributable to the controller's use of an enabling control style and, to some extent, formal controls. Against this backdrop, it becomes relevant to understand how the use of an enabling control style interacts with the use of formal controls (and informal controls). We thus conducted a post-hoc analysis to test for interaction effects, following Carte & Russell's (2003) three-step process: First, we analysed the relationships between the control variables and the dependent variables (step 1); we then added the main effects (step 2), and finally the interaction effects (step 3). To construct the interaction terms, we used the two-stage approach suggested by Hair et al. (2014).

The test results revealed one significant interaction effect: ISD project managers' use of an enabling control style negatively moderates the relationship between formal controls and job satisfaction ($ß = -0.179$, $t = 2.668$, $p < 0.01$). The effect size is small ($f^2 = 0.044$) (Cohen, 1988). Figure 4, showing the interaction plot, reveals that controllee job satisfaction is always higher if the controller uses an enabling control style to a high extent (see *green* line). In that case, increased use of formal controls seems to have only a marginally positive effect on job satisfaction. However, if the controller uses an enabling control style to a low extent (see *blue* line), increased use of formal controls has a more pronounced positive effect on job satisfaction.

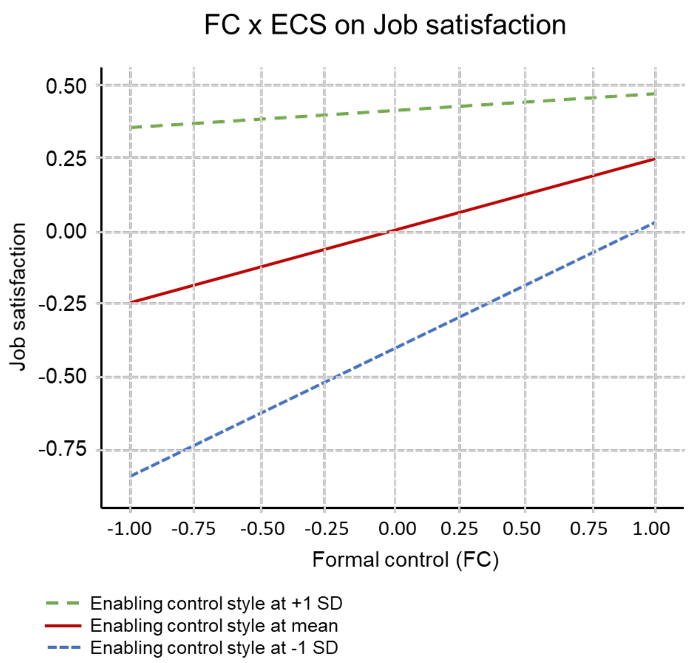

Figure 4: Interaction Plot (Formal Control x Enabling Control Style on Job Satisfaction)

While the other interaction effects were not significant, their interaction plots show a similar pattern (see Table 7 and Figure 5 in Appendix C).

Limitations

Before we discuss the study results, the following limitations should be noted. First, we conceptualize and measure enabling control style as a continuum ranging from low to high, thereby equating a low enabling control style with an authoritative control style. While this is consistent with prior research within and outside the IS domain (e.g., Adler & Borys, 1996; Gregory et al., 2013; Wiener et al., 2016), existing studies also indicate that both styles may coexist, for example when a tandem of two project managers uses contrasting control styles (Gregory & Keil, 2014). Future studies should thus consider conceptualizing the two control styles as separate dimensions, to explore if and how an ISD project manager can combine authoritative and enabling control styles, and how the two styles complement or counteract each other. Here, researchers could draw on control studies that explore the interplay between diagnostic and interactive uses of formal management control systems (e.g., Widener, 2007). Second, and relatedly, in line with Keil et al. (2013), we modelled both formal and informal control as multi-dimensional, second-order constructs. We did so partly because our main goal was to contrast the effects of the two basic control modes with those of control style. Building on the results of our study, future research should also examine the effects of individual control modes (e.g., behaviour and self-control) on different control styles.

Third, although our study controlled for the effects of several context variables (e.g., ISD methodology) and tested for differences in control-mode and control-style effectiveness patterns between internal and outsourced projects, future control studies should pay additional attention to contextual influences (cf. Hong et al., 2013), including moderating (high project uncertainty) and mediating (e.g., controller-controllee power asymmetries and project uncertainty) effects.

Fourth, all measures were gathered from a single source (controllees) and task performance was self-reported, which may induce some bias. For example, extensive use of formal controls (e.g., tight behaviour controls) might affect how the controllee perceives her task performance (e.g., might make her believe that the controller is not satisfied with how she performs). Future studies should thus aim to collect data from both sides of the controller-controllee dyad in order to account for potential perception differences. Finally, our focus was on individual-level outcomes (including task performance). Consequently, our results cannot be easily compared with studies looking at higher-level outcomes (e.g., project performance) (e.g., Sakka et al., 2013), since cross-level effects between the individual and project level can be expected (Venkatesh et al., 2018). A promising avenue for future research would be to develop and analyse multi-level research models that capture and unpack such complex effects.

Discussion

Drawing on an online survey with project team members from 171 ISD projects, this study addresses key shortcomings in prior ISD project control research and offers a first empirical test of the *Integrated IS Project Control Theory* (Wiener et al., 2016). Overall, our study provides significant support for a key aspect of this theory by confirming the positive impact of an enabling control style on ISD project team members' task performance and job satisfaction, and by demonstrating that control style is a stronger predictor of individual-level control effects than control modes. In particular, while the control style-related hypotheses (H3ab) were fully supported by the data-analysis results, the control mode-related hypotheses (H1ab and H2ab) were not.

Thus, the study results strongly suggest that it is time to make sure that the conversation about IS project control is extended to also include control styles. Specifically, by conceptualizing control activities in terms of both control modes (*what*) and control styles (*how*), our study helps push research on IS project control beyond the control mode-centred view that dominates prior research (e.g., Kirsch, 1997; Gopal & Gosain, 2010; Tiwana & Keil, 2009). Additionally, our study shifts the focus from 'intended' performance effects of control activities at the project level to performance and socio-emotional effects at the individual level, also referred to as human-relations outcomes in the broader organizational control literature (Cardinal et al., 2017). Consequently, our study not only adds to the existing body of IS project control research but also to control research in neighbouring disciplines such as management accounting and management.

Theoretical Contributions

Our study's main theoretical contribution lies in expanding the dominant mode-focused view of existing ISD project control research by building on and extending recent work acknowledging the importance of *how* control is enacted (Gregory et al., 2013; Gregory & Keil, 2014; Wiener et al., 2016). We do so by comparing the effects of control modes (*what*) and control style (*how*) and offering empirical support for the latter's superior explanatory power at the individual controllee level. Specifically, the analysis results clearly indicate that control style 'outperforms' control modes when it comes to explaining control effects at the individual level. Also, the size of the control-style effects is larger than the size of the control-mode effects. The IPMA results confirm this conclusion: The use of an enabling control style shows by far the highest importance scores of all constructs. This finding implies that neglecting control style restricts the explanatory power when predicting (individual-level) control effects. This also implies that future studies should at least control for the effects of the controller's control style when studying the outcomes of control activities. Moreover, the finding that '*how*' controls are enacted (style) is more important than '*what*' controls are used (modes) suggests that controllee task performance and job satisfaction are strongly connected to socio-relational qualities of the controller-controllee relationship. This opens an avenue for connecting ISD project control research to aspects of leadership (e.g., Kayworth & Leidner, 2002).

Additionally, our study contributes to the existing body of IS project control research by exploring the interaction between control modes and control styles. Our analysis of interaction effects provides further empirical support for the superior role of an enabling control style in predicting control effects at the individual level. Moreover, the analysis shows an interesting pattern: The positive effect of formal controls on both job satisfaction and task performance is more pronounced in situations where the controller uses a low rather than a high enabling control style, suggesting that using an enabling control style partly crowds out the positive effects of formal controls. In contrast, we find no significant interaction effects between informal controls and enabling control style. However, looking at clan and self-control separately might reveal such effects, since these two informal control modes are arguably more diverse in nature than the three formal control modes. Thus, the interaction between control modes and styles represents a promising avenue for future ISD project control research. For example, addressing strategies for managing complexity arising from the interactive effects of combining control modes, Gill (2019) provides a framework that might also inform how an enabling control style can be blended with multiple control modes (including clan control) established over time. Relatedly, given that the features of an enabling control style partly overlap with those of an interactive control use (e.g., Bisbe & Otley, 2004), it would be interesting to explore how those features (e.g., managers' non-invasive and facilitating involvement) interact with certain qualities of (formal) management control systems.

Another important contribution of our study concerns its focus on individual level control effects, which is in contrast to most existing ISD project control studies focused on project level effects (Wiener et al., 2016). While these studies have certainly made important contributions to our understanding of the control of ISD projects, the aggregation of their results reveals numerous inconclusive or even contradictory control effects (Henry et al., 2015; Wiener et al., 2016). This suggests that the causal chain of how control activities affect outcome variables at the project level is more complex than (implicitly) assumed in prior research (Venkatesh et al., 2018). By addressing individual-level control effects, our study provides a critical link to better understand control effects also at the aggregated project level. Thus, the study at hand may also encourage related research on the interactive/diagnostic use of management control systems, which, so far, has also mainly focused on control outcomes at the project/organisational level (e.g., Bisbe & Otley, 2004; Sakka et al., 2013).

A related contribution of our study lies in expanding the focus of ISD project control studies on performance effects by also including socio-emotional effects. For example, we find that project managers' use of an enabling control style is positively and significantly related to project team members' job satisfaction. Further, while we hypothesized a negative relationship between formal controls and job satisfaction, our data analysis points to a significantly positive relationship between the two. This suggests that the link between formal control and job satisfaction is more complex than anticipated and might be moderated by project and stakeholder context factors (e.g., Morris & Venkatesh, 2010). For example, ISD professionals tend to show a preference for logic and conservatism, which makes them more susceptible to uncertainty associated with role ambiguity (Rutner, Hardgrave, & McKnight, 2008)—a key antecedent of job dissatisfaction (Igbaria, Parasuraman, & Badawy, 1994). Formal controls that make controllees' project roles less ambiguous may thus lead to increased job satisfaction. Such logic is supported by Jaworski et al. (1993), and Tripp et al. (2016), who find that formal controls enacted through agile practices are positively related to job satisfaction. An alternative explanation could be that the relationship between formal controls and job satisfaction is not linear, but follows an inverted u-curve shape. If so, controllees would initially respond well to the use of formal controls, improving their job satisfaction, but over a certain threshold, controllees would feel 'over-controlled', diminishing their job satisfaction.

Practical Implications

Our results also provide several practical implications to help ISD managers further enhance the effectiveness of their control portfolios and project control strategies. Most importantly, the study highlights that the style in which controls are enacted (*how*) is more important for control effectiveness than the specific controls used (*what*), at least at the individual level. Thus, ISD managers aiming for performance improvements should try to enact controls in a more enabling control style, rather than constantly adjusting and fine-tuning their control portfolios. Additionally, our study results also serve as a reminder that effective control of ISD projects requires careful adaptation of control activities—both control modes and control style—to the specific context. For example, if context factors prompt the project manager to limit team-member participation, and use a less enabling control style, the manager should focus on providing direction through formal controls.[4] We believe that formal control is required to some extent in all ISD projects; the challenge for the managers is to determine a 'good fit' between formal control and enabling style in their project's context. In this regard, clearly, future research is warranted to explore the ways of achieving, and maintaining, a 'good fit' between the control approach employed and the often highly dynamic context of ISD projects.

Conclusion

Our study presents exciting new findings that change the way we should think about, conduct research on, and exercise control in ISD projects. More specifically, by more broadly conceptualising control activities (incorporating control modes and control styles) and by also considering socio-emotional control effects at the individual level, our study offers novel and actionable insights into the effective control of ISD projects. A key finding is that control style (*how*) is a stronger predictor of task performance and job satisfaction than control modes (*what*). Our study's overarching contribution thus

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[4] We are indebted to a reviewer for providing this insight.

lies in providing empirical support for the *Integrated IS Project Control Theory*, and in particular for the importance of jointly considering control modes and styles to better understand what distinguishes effective from ineffective control approaches in ISD projects.

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Appendix A: Construct Measures

Table 3. Construct Measurement Items (and Loadings)

Item	Source
Input Control (IC)	
(1) Other team members and I consist of professionals out of different divisions. (0.689)	Yu & To (2011), based on Snell (1992)
(2) My superiors encourage employees to further enhance their capabilities. [1]	
(3) My superiors select team members not only by professional competence but also by personality and personal values. (0.666)	
(4) My superiors emphasize the internalization of the goals, values and norms of the organization. (0.801)	
(5) Other team members and I get rewarded based on the level of individual skills. [1]	
Behaviour Control (BC)	
(1) I am expected to follow an understandable written sequence of steps toward accomplishing project goals. [2]	Tiwana & Keil (2009), Snell (1992)
(2) I am expected to follow an understandable written sequence of steps to ensure that system requirements are met. [2]	
(3) I am expected to follow an understandable written sequence of steps to ensure the success of this project. (0.763)	
(4) I get assessed by the extent to which I follow existing written procedures and practices. (0.716)	
(5) Frequent meetings are held to discuss performance. (0.755)	
Outcome Control (OC)	
(1) My superiors place significant weight upon timely project completion. (0.716)	Kirsch (1996), Snell (1992)
(2) My superiors assess me by the extent to which project goals are accomplished, regardless of how the goals are accomplished. [1]	
(3) I get rewarded according to producing the desired outcomes, regardless of how the outcomes are produced. (0.645)	
(4) Pre-established targets are used as a benchmark for evaluations. (0.809)	
Clan Control (CC)	
(1) Other team members and I actively participate in project meetings to understand the project team's goals, values and norms. (0.801)	Kirsch et al. (2002)
(2) Other team members and I attempt to be a "regular" member of the project team. [1]	
(3) Other team members and I attempt to understand the project team's goals, values and norms. (0.733)	
(4) Other team members and I get rewarded based on the level of acting in accordance with shared values and attitudes. (0.600)	
Self-Control (SC)	
(1) I set specific project goals without the involvement of others. (0.779)	Brief & Aldag (1981), Kirsch et al. (2002)
(2) I manage myself because I am communicated that self-management is rewarded based on performance evaluation schemes. (0.795)	
(3) My ability to exercise better self-management gets enhanced. [2]	
(4) I get trained in appropriate techniques for self-management. [2]	
(5) I define specific procedures for project activities without the involvement of others. (0.867)	

Enabling Control Style: Repair (ECS-R)	
(1) I am able to identify a well operating development process. (0.841)	Self-developed
(2) I am able to identify opportunities to improve the development process. (0.863)	
(3) I am allowed to deviate from defined procedures. (0.846)	
(4) I am allowed to fix problems in the development process. (0.858)	
(5) My superiors appreciate feedback to real work contingencies. [1]	
Enabling Control Style: Transparency (ECS-T)	
(1) The development procedures are communicated as lists of flat assertions of duties. [R1]	Self-developed
(2) I have insights into development processes by getting information about their key components and by having information about best practices. (0.837)	
(3) I am expected to merely implement the communicated work instructions. [1]	
(4) My superior provides me with an understanding of the rationale behind the development processes. (0.774)	
(5) I get regular feedback about my performance. [1]	
(6) I am aware of how my own tasks fit into the entire part. [1]	
(7) The contextual information I have access to support me to interact creatively with the broader project organization and its environment. (0.659)	
(8) I am regularly informed about other projects contexts in order to interact creatively with my organization and environment. (0.686)	
Task Performance (TP)	
(1) My work in the project meets the quality that the projects expect from their members. (0.863)	Carillo (2014), Koopmans et al. (2014)
(2) My contributions meet the project's performance expectations. (0.835)	
(3) I make the project my highest priority. (0.664)	
(4) I adequately complete my project tasks. (0.878)	
Job Satisfaction (JS)	
(1) I feel fairly well satisfied with my present job in the project. (0.900)	Weiss et al. (1967)
(2) Most days I am enthusiastic about working in the project. (0.884)	
(3) Each day of work in the project seems like it will never end. [R1]	
(4) I find real enjoyment in my project work. (0.875)	
(5) I consider my job in the project rather unpleasant. [R1]	

Notes: All items are based on 5-point Likert scales, using 'strongly agree' and 'strongly disagree' anchors.

[R] Reversed item.

[1] Item removed based on the construct-validation process.

[2] Item removed to ensure equal number of measurement items across second-order construct dimensions.

Appendix B: Construct Reliability and Validity

Table 4. Construct Correlations, AVE, and Composite Reliability

	PE	PTS	AM	WM	FC	IFC	ECS	TP	JS
PE	**1.000**								
PTS	0.085	**1.000**							
AM	0.067	-0.109	**1.000**						
WM	0.131	-0.371*	-0.068	**1.000**					
FC	-0.102	0.284**	-0.032	-0.181*	**0.717[A]**				
IFC	0.159*	0.046	0.003	0.056	0.262**	**0.740[A]**			
ECS	0.459**	0.043	0.049	0.146	0.211	0.501	**0.901[A]**		
TP	0.224**	0.063	0.037	0.008	0.244**	0.355**	0.526**	**0.815**	
JS	0.032	0.024	-0.029	0.072	0.369**	0.320**	0.429**	0.449**	**0.758**
AVE / R^2_a	1.000	1.000	1.000	1.000	0.514[A]	0.548[A]	0.813[A]	0.664	0.786
Comp. Rel.	1.000	1.000	1.000	1.000	N/A	N/A	N/A	0.886	0.917

Notes: PE = Project experience, PTS = Project team size, AM = Agile methodology, WM = Waterfall method., FC = Formal control, IFC = Informal control, ECS = Enabling control style, TP = Task performance, JS = Job satisfaction.
[A] Based on adequacy coefficient (R^2_a); calculated for second-order reflective-formative constructs (FC, IFC, ECS).
* $p < 0.05$, ** $p < 0.01$; two-tailed test.

Table 5. Discriminant Validity (HTMT)

	PE	PTS	AM	WM	FC	IFC	ECS	TP	JS
PE	---								
PTS	0.085								
AM	0.067	0.109							
WM	0.131	0.371	0.068						
FC	0.176	0.338	0.118	0.249					
IFC	0.273	0.162	0.107	0.150	0.710				
ECS	0.477	0.087	0.082	0.163	0.449	0.719			
TP	0.246	0.076	0.045	0.066	0.342	0.544	0.609		
JS	0.036	0.025	0.058	0.076	0.438	0.433	0.498	0.538	---

Notes: PE = Project experience, PTS = Project team size, AM = Agile methodology, WM = Waterfall method., FC = Formal control, IFC = Informal control, ECS = Enabling control style, TP = Task performance, JS = Job satisfaction.

Appendix C: Additional Analyses

Table 6. Control-Mode Effects on Task Performance and Job Satisfaction

	Task Performance			Job Satisfaction		
Construct	*ß*	*t-value*	*f²*	*ß*	*t-value*	*f²*
Project experience	**0.202****	**3.073**	**0.046**	0.025	0.393	0.001
Project team size	-0.022	0.274	0.000	-0.054	0.672	0.003
Agile methodology	0.027	0.437	0.001	-0.020	0.252	0.000
Waterfall methodology	-0.004	0.050	0.000	0.097	1.402	0.010
Formal control	**0.201****	**2.686**	**0.041**	**0.347*****	**4.385**	**0.125**
Informal control	**0.271****	**2.636**	**0.080**	**0.222***	**2.592**	**0.055**
R^2 / R^2 adjusted (%)	19.0 / 16.0			20.7 / 17.8		
Notes: Significant effects in boldface. * p < 0.05, ** p < 0.01, *** p < 0.001; two-tailed test.						

Table 7. Interaction Effects between Control Modes and Styles

	Task Performance			Job Satisfaction		
Interaction term	*ß*	*t-value*	*f²*	*ß*	*t-value*	*f²*
Formal control X Enabling control style	-0.072	1.221	0.007	**-0.179****	**2.668**	**0.044**
Informal control X Enabling control style	-0.042	0.560	0.003	-0.031	0.440	0.002
R^2 / R^2 adjusted (%)	31.4 / 27.6			32.9 / 29.1		
Notes: Significant effects in boldface. * p < 0.05, ** p < 0.01, *** p < 0.001; two-tailed test.						

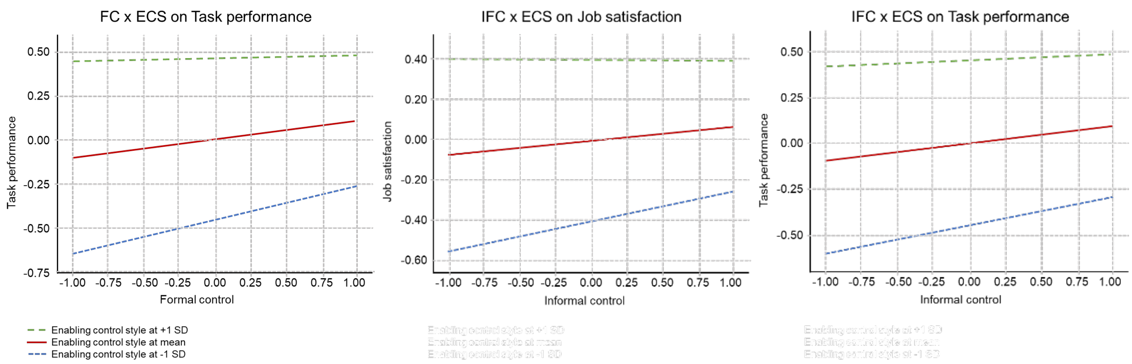

Figure 5: Interaction Plots (Non-Significant Effects)