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A conceptual framework of the adoption of innovations in organizations: a meta-analytical review of the literature

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Abstract
Studies on the adoption of innovations in organizations are abundant and have introduced many different factors that are likely to influence adoption decisions yet, somehow, without an integrated view among them and with somehow contradictory empirical results. This study introduces a conceptual framework in which the attributes of innovation–adoption decision linkages in organizations are mediated by both the behavioral preferences of managers and organizations' resources and moderated by the innovation life cycle. It further meta-analytically tests the framework's predictions on 185 primary empirical studies. The findings are expected to contribute to the literature on the adoption of innovations by deepening the theoretical conditions and empirical factors that are likely to influence adoption decisions in organizations. The study also has implications for practice, since it sheds light on the factors that practitioners can leverage to manage the diffusion of innovations.

Keywords Adoption of innovations in organizations · Behavioral preferences of managers · Organization's resources · Innovation life cycle · Meta-analysis

Details of all works included in the meta-analysis are reported in an electronic companion available from both the journal's website and the home page of Gianluca Vagnani on the Department of Management, Sapienza, University of Rome.

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1 Introduction

An innovation is commonly referred to as "an idea, practice, or object that is perceived as new by an individual or other unit of adoption" (Rogers 1983, p. 35). This study focuses on innovation adoption at the organization level, that is, the adoption of an innovation generated elsewhere (Zaltman et al. 1973; Rogers 1983; Angle and Van de Ven 1989) with the aim of using it as the best course of action available for the entire organization and/or for its sub-organizational units (Rogers 1983). Therefore, the study refers to innovations adopted with the intention of being used within an organization (e.g., an information system, an accounting payable system, an e-commerce system) as a productive resource and to achieve superior performance (Schumpeter 1934; Rogers 1983; Reed and DeFillippi 1990; Porter 2005). The study of adoption decisions in organizations is important because, as observed by March and Simon (1958) and noted by wide-ranging research on the adoption of innovations (for a review see Wolfe 1994; Crossan and Apaydin 2010), most innovations in organizations result from borrowing rather than from invention.

According to diffusion theory, the characteristics (or attributes) of innovations are assumed to influence the adoption decisions made by managers in organizations (Rogers 1983). However, in organizational innovativeness research (Tornatzky and Klein 1982; Wolfe 1994; Subramanian and Nilakanta 1996), empirical results on the association between the attributes of innovations and organizational innovation adoption are often contradictory. Downs and Mohr (1976) suggested that it is unlikely to find the same relationship between a given innovation's attribute and adoption decisions across a large array of organizations. Wolfe (1994) further discussed the inconsistency of empirical findings on the adoption of innovations by organizations (see also Premkumar 2003; Bruque and Moyano 2007). For example, although it is theoretically established that a relative advantage is positively associated with adoption decisions, empirical evidence to the contrary has been found (e.g., Kurnia et al. 2015). In the same vein, although complexity is considered to be negatively associated with adoption decisions, some studies have offered disconfirming results (Seyal and Rahman 2003; Messerschmidt and Hinz 2013). Consequently, across different empirical studies on the adoption of innovations by organizations, findings inconsistent with theoretical predictions are still being observed (Tidd 2001; Keupp et al. 2012). Therefore, this study attempts to identify those attributes of innovations that are significantly associated with adoption decisions in organizations.

In the literature on organizations' strategies, behaviors, and outcomes, many organizational decisions can be considered reflections of the behavioral preferences of their managers (Hambrick and Mason 1984). At the same time, in the field of organizational innovativeness, scholars have recurrently claimed that, in accordance with traditional models of industrial buyer behaviors (Sheth 1973), the adoption of innovations is also affected by broader technological, organizational, and environmental conditions (Wolfe 1994; Frambach and Schillewaert 2002). In the same vein, concerning the adoption of the new manufacturing logics labeled Industry 4.0 by organizations, business magazines have referred to the relevance of the attributes of this new technology to its adoption, particularly its potential benefits for manufacturing productivity, as well as its high compatibility with standard and widely used Internet-based protocols. In addition, the key roles played in the adoption decisions by both decision makers—who need to recognize the attributes of innovations and understand how these could positively impact ways of doing business—and organizations' greater availability of knowledge about digital technologies have been pointed out, particularly in the early adoption of such technology by organizations. Despite the theoretical underpinnings, few empirical studies (e.g., Harrison et al. 1997) and meta-analytical reviews (e.g., Weigel et al. 2014) consider the effects of individual conditions, specifically the preferences of managers, on the attributes of innovation–adoption decision linkages. To the best of our knowledge, none of these have combined, in a meta-analytical review, such individual conditions with the organization (i.e., organization's resources) and environmental conditions (i.e., the innovation life cycle) in understanding adoption decisions in organizations.

This study thus focuses on the attributes of innovation–adoption decision linkages, which are also at the core of the narrative and quantitative reviews of the literature (e.g., Tornatzky and Klein 1982; Jeyaraj et al. 2006; King and He 2006; Anderson et al. 2014; Kapoor et al. 2014a, b; Weigel et al. 2014; van Oorschot et al. 2018), and attempts to propose a multidimensional conceptual framework considering adoption decisions in organizations to be associated with the attributes of innovations (Tornatzky and Klein 1982; Rogers 1983), the behavioral preferences of managers (Fishbein and Ajzen 1975; Pierce and Delbecq 1977; Kimberly and Evanisko 1981), the adequacy of an organization's resources (Camisón-Zornoza and Villar-López 2014), as well as environmental conditions, specifically the innovation life cycle (Rogers 1983; Waarts et al. 2002).

The research method is a meta-analysis. Predictions stemming from the study's framework are tested on a sample of 185 studies published between 1995 and 2017 in 42 different countries, covering 36,547 observations at the organizational level. Meta-analytical methods are increasingly employed in management research (Carney et al. 2011; Rosenbusch et al. 2013), particularly in studying associations between variables analyzed in large numbers of studies that show mixed and conflicting findings. In addition, by combining data collected from many different organizations and periods, which would be infeasible in typical research, meta-analysis allows for a complete and rigorous analysis of available observations with data that are more proximate to conclusive than those included in any sole primary research (Miller and Cardinal 1994).

This paper makes many contributions to organizational innovativeness research. The proposed multidimensional conceptual framework considers various conditions critically associated by scholars and practitioners with adoption decisions in organizations (Crossan and Apaydin 2010). At the same time, as often advocated in the literature (Downs and Mohr 1976), theoretical models on the adoption of innovations in organizations, specifically innovation diffusion theory (Tornatzky and Klein 1982; Rogers 1983), the theory of planned behavior (Ajzen 1991), and the awareness–motivation–capability model (Livengood and Reger 2010), are integrated. Additionally, the role of both managers' preferences and organizations' resources in adoption decisions in organizations are considered, thus considering them mediating variables. This study then relates closely to both the meta-analysis of Weigel et al. (2014), who only tested the direct effects of antecedents derived from both the diffusion of innovation theory and the theory of planned behavior on the innovation adoption decisions of individuals and organizations, and the study of Vagnani and Volpe (2017), where only the mediating role of behavioral preferences of managers (but not of organizational resources) was considered in the attributes of the innovation–adoption decision chain in organizations.

Furthermore, the framework of this study captures the moderating effects of the innovation life cycle at the environmental level on innovation adoption decisions at the organizational level. Consequently, micro and macro levels of analysis are integrated (Bamberger 2008). To the best of our knowledge, no previous meta-analysis has offered such integration of the innovation life cycle with the attribution of innovation–mediator–adoption decision linkages in organizations.

Moreover, a mediation/moderation meta-analysis is performed, combining univariate analysis (Schmidt and Hunter 2004), moderated regression analysis (Lipsey and Wilson 2001), and structural equation modeling (Cheung and Chan 2005). Such a meta-analysis has resulted in empirical evidence that the attributes of innovations, the preferences of managers, and organizations' resources matter for adoption decisions in an organization and their influence on estimates, particularly the behavioral preferences of decision makers, are contingent upon the stage of the innovation life cycle at which the adoption decision is made. This study, then, is expected to contribute to the generalizability and cumulativeness of organizational innovation research, while promoting more integrated, precise, and rigorous innovation adoption theories.

Finally, this study also contributes to practice by focusing on the mechanisms that can be leveraged by organizations to sustain or hamper the diffusion of innovations.

2 Conceptual framework

A multidimensional conceptual framework is proposed that considers adoption decisions to be an organizational choice influenced by various sources, specifically the technology, the individual, the organization, and the environment (see Fig. 1). These sources are

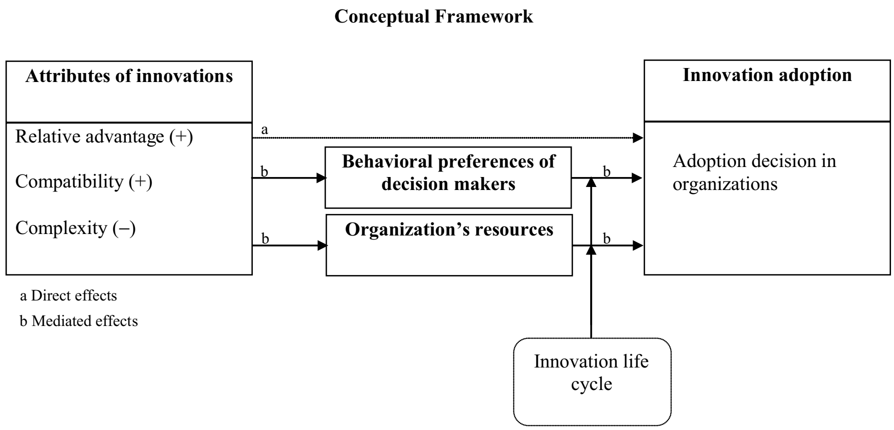

Fig. 1 Conceptual framework

captured by the study's framework via influencing conditions as the attributes of innovations, the preferences of those managers responsible for adoption decisions in organizations, the adequacy of organizational resources, and the innovation life cycle.

Concerning technological conditions, in line with innovation diffusion theory (Tornatzky and Klein 1982; Rogers 1983), the attributes of innovations (i.e., relative advantage, compatibility, and complexity) matter for an adoption decision (Rogers 1983, p. 211) and that relative advantage or compatibility (complexity) is likely to have positive (negative) effects on innovation adoption in organizations (Tornatzky and Klein 1982; Taylor and Todd 1995; Thong 1999). This study's focus on relative advantage, compatibility, and complexity is based on theoretical, empirical, and practical considerations. On the one hand, according to the decomposed theory of planned behavior (Taylor and Todd 1995), unlike observability and trialability, relative advantage, compatibility, and complexity are associated with the preferences of decision makers in adoption decisions. In addition, mediation analysis implies a stable and significant relationship between dependent and independent variables. Consequently, stable and significant relationships are observable for relative advantage–, compatibility–, and complexity–adoption decision associations, just not for observability and trialability (Arts et al. 2011). On the other hand, among the attributes of innovations, scholars have identified relative advantage, compatibility, and complexity as salient determinants, since they explain most of the variance associated with adoption decisions (Tornatzky and Klein 1982; Davis 1989). Thus, by focusing on the salient attributes of innovations, a more parsimonious and effective framework can be built. However, the possibility of including observability and trialability in this study's framework to further understand adoption decisions in organizations remains at the top of the agenda.

Regarding other conditions, although studies have considered the preferences of managers (Kimberly and Evanisko 1981; Thong and Yap 1995; Premkumar and Roberts 1999) as well as organizations' resources (Taylor and Todd 1995; Alexandra and Kassim 2013) as independent variables that are likely to have, as attributes of innovation, a direct effect on adoption decisions, this study adopts a difference stance. In particular, by referring to both innovation diffusion theory (Tornatzky and Klein 1982; Rogers 1983) and the theory of planned behavior (Ajzen 1991), it assumes the behavioral preferences of managers as well as resources (Ajzen 1996) to be a mediating variable in the attributes of the innovation–adoption decision linkage in organizations. Both these theories have been widely employed in studies about innovation adoption in organizations (Harrison et al. 1997; Thong 1999). Innovation diffusion theory and the theory of planned behavior are complementary, since they consider the adoption of innovations in organizations to affected by the available stock of resources, which mediates the attributes of innovation–adoption decision linkages in organizations (Zmud and Apple 1992; Camisón-Zornoza and Villar-López 2014). Assuming an organization's resources as a mediating variable is consistent with both the information–motivation–behavioral skill model (Fisher et al. 2002) and the awareness–motivation–capability model (Chen 1996; Arend 2014). The proposed framework is now finally sensitive to environmental conditions, as captured by the stages of the innovation life cycle at which an adoption decision is made (Waarts et al. 2002).

2.1 Managers' behavioral preferences

In the proposed framework on innovation adoption decisions from an organization as a whole and/or from one of its sub-organizational units, behavioral preferences refer to a decision maker whose organizational role directly influences the adoption of innovations from the relevant organization (Cordano and Frieze 2000). In other words, this study focuses on the behavioral preferences of a manager in charge of searching, evaluating, and eventually adopting new technologies for the entire organization and/or some of its sub-organizational units.

In light of the theory of planned behavior, the preferences mentioned include attitudes, norms, and perceived behavioral control (Ajzen 1991). Such preferences are contingent on both the decision maker and the behavior to be adopted. In that, they differ from both general attitudes and personality traits that merely define broad individual dispositions toward choices and actions (Fishbein and Ajzen 1975). Decision makers' behavioral preferences as a mediating variable stem from the original (Ajzen 1991) and decomposed (Taylor and Todd 1995) theory of planned behavior and from the correlated information-processing model on which the aforementioned theories are based. According to such schemata, an innovation signals and offers the decision maker information (e.g., its relative advantage). Thanks to a prior cognitive activity based on the available information, a decision maker is expected to form his/her own beliefs, which are likely to shape the behavioral preferences. The latter, in turn, tend to influence the decision maker's decision to adopt a certain behavior (e.g., see also Riemenschneider et al. 2003).

Attitudes capture a decision maker's assessment of positive and negative outcomes from a possible behavior (Fishbein and Ajzen 1975; Ajzen 1987). Concerning the adoption of innovations, this paper supposes that the attributes of an innovation affect a decision maker's attitude toward it and, in turn, the latter is likely to influence innovation adoption. For the attributes of the innovation–attitude association, by signaling to a decision maker the net advantages of a new technology (in terms of higher customer satisfaction, improved efficiency, adoption efforts moderated by the new technological compatibility, and low complexity), the attributes of an innovation correspond closely, as noted by the decomposed theory of planned behavior (Taylor and Todd 1995), to attitudinal beliefs, which are assumed to be antecedents of a decision maker's attitude (Ajzen 1991).

Regarding the attitude–innovation adoption linkage, it is well noted by the theory of planned behavior, as well as by the theory of propositional control, that a favorable attitude developed toward a behavior (i.e., here an innovation to be adopted) positively influences an adoption decision (Dulany 1961; Rogers 1983; Ajzen 1987, 1991). Finally, due to the role played by the decision maker's attitude, the attributes of the innovation–adoption decision relationship in organizations are likely to weaken (see also the theory of reasoned action of Fishbein and Ajzen (1975). In this vein, for example, a new technology with positive features—specifically, in terms of the reduction of the time to market of new products—could have minimal effects on the adoption decision in an organization. This is because a decision maker could have developed an attitude according to which the potential reduction of time to market of the innovation is limited and/or is also a secondary driver in evaluating the benefits of the innovation for the decision maker's organization. A further example is a decision maker with an aversion developed toward an innovation characterized by a low level of complexity, since the decision maker believes that its adoption can be a source of additional costs for the organization. Consequently, because of the decision maker's negative attitude, the new technology has less of a chance of adoption. Therefore, a path is envisaged from the attributes of innovations to adoption decisions in organizations, via managers' attitudes. This discussion leads to the following hypothesis.

H1 Relative advantage and compatibility (complexity) will positively (negatively) influence a decision maker's attitude, which, acting as a mediating variable, is likely to positively affect adoption decisions in organizations.

The norm (or subjective norm) incorporates pressures perceived by a decision maker from important others to perform (or not perform) a behavior (Ajzen 1991). If attitude involves the decision maker's personal factors that influence an adoption decision, the norm relates to the perceived social factors shaping the decision maker's decisions. Regarding the adoption of innovations, the aforementioned attributes of an innovation are likely to influence a decision maker's subjective norm, which, in turn, affects the decision maker's decision to adopt such an innovation at the organizational level. More precisely, for the attributes of the innovation–norm association, the attributes of innovations are likely to shape the attitudinal beliefs of a focal organization's important others (e.g., partners, suppliers, customers); such beliefs affect those people's attitudes, which, in turn, solicits their propensity not only to adopt the new technology but also to sustain its adoption in the focal organization. Therefore, an innovation provided with relative advantage and compatibility (complexity) is likely to be supported (discouraged) by some organizations, which, in turn, increases (decreases) the perceived pressures on a decision maker regarding its adoption in the relevant organization.

From a different perspective, Ryan (1982) introduced the concept of false consensus, which, given decision makers' inclination to overemphasize their own dispositional factors, tends to reinforce the perception of significant others' pressure regarding the adoption of an innovation (Ross 1977; Oliver and Bearden 1985; Taylor and Todd 1995). Second, a norm is expected to be positively related to adoption decisions. Norms are likely to influence innovation adoption via compliance mechanisms (Fishbein and Ajzen 1975; Ajzen 1991), either when a decision maker accepts external pressures as evidence of reality or when driven by his/her own biased projected expectations on important others' preferences about the attributes of an innovation. Put more simply, whenever a decision maker supposes that, due to its perceived attributes, an innovation is supported (or discouraged) by the relevant organization's stakeholders, the considered decision maker could be sufficiently motivated to comply with such a belief, which, in turn, will tend to affect the decision maker's adoption decision (Taylor and Todd 1995). Third, relationships between the attributes of innovations and adoption decisions are expected to likely be weakened by norms. According to Fishbein and Ajzen

(1975), a decision maker's intention to carry out a behavior is determined only by the decision maker's developed norms and, again, any external variables (as the attributes of innovations) can influence the decision maker's decisions only by affecting his/her norms. Consider, for instance, a new inventory management software with relatively strong advantages for an organization. Despite such benefits, a decision maker could be reluctant to adopt it because, due to the decision maker's own attitudes, the decision maker believes that such an innovation is not sufficiently beneficial for the relevant organization; in addition, the decision maker has formed a norm that assumes that key suppliers will not support the adoption of the considered new technology. Nevertheless, the innovation above could have a chance of being adopted, thanks to the decision maker's norm based on the perceived expectation that important others are suggesting the innovation adoption. The attributes of innovations are, then, likely to influence an adoption decision if they are able to sustain the decision maker's development of a favorable norm. The discussion leads to the following hypothesis.

H2 Relative advantage and compatibility (complexity) will positively influence (negatively) a decision maker's norms, which, acting as a mediating variable, are likely to positively affect adoption decisions in organizations.

Perceived behavioral control refers to the personal judgments of a decision maker of his/her own skills and capabilities to catch up with an adoption decision (Ajzen 1991; Ajzen and Driver 1992). In accordance with the decomposed theory of planned behavior (Taylor and Todd 1995), higher complexity is expected to likely be negatively associated with perceived behavioral control. Complex technologies often result from several interacting parts that require specific abilities to configure them with high reliability (Perrow 1994). In addition, the adoption of complex innovations implies steep barriers to be overcome by and demands the decision maker's greater cognitive efforts. Consequently, the decision maker could perceive a complex innovation as subjectively threatening, even because of the decision maker's supposedly limited skills and capabilities to successfully adopt it in the relevant organization (Bandura 1977; Triandis 1979).

Perceived behavioral control is also expected to be positively related to adoption decisions. Perceived control over an innovation tends to make a decision maker more confident of being able to overcome obstacles, risks, and ambiguities related to innovation adoption, so that the adoption decision is positively influenced (Ajzen 1985). In addition, the complexity–adoption decision linkage is likely to be weakened by the decision maker's perceived behavioral control. According to Ajzen's (1991) theory of planned behavior, a decision maker's intention to perform a certain behavior is determined only by the decision maker's perceived behavioral control. Consequently, complexity can influence adoption decisions exclusively by affecting the actor's perceived behavioral control. For example, even a complex innovative technology involving various subsystems could be determined as easy to use by a decision maker who has acquired specific skills for it; thus, an adoption decision is likely to be made. In the same vein, a moderately complex new technology could be perceived by a manager as so much beyond of his/her own control that the decision on its adoption becomes more difficult. The complexity of an innovation is, then, likely to influence an adoption decision if it induces a change in the decision maker's beliefs about his/her own behavioral control. Therefore, consistent with Ajzen's (1991) theory of planned behavior, the perceived behavioral control of a decision maker mediates the complexity–adoption decision linkage. This discussion leads to the following hypothesis.

H3 Complexity will negatively influence a decision maker's behavioral control, which, acting as a mediating variable, is likely to positively affect adoption decisions in organizations.

2.2 Organizations' resources

The behavioral preferences of decision makers in conjunction with appropriate resources have been observed to enable the adoption of a given behavior (Ajzen 1996). In this vein, an organization's resources reflects its assets, capabilities, and processes, as well as the organizational attributes, information, and knowledge it controls (Barney 1991), enabling it to approach and adopt innovations (Attewell 1992; Camisón-Zornoza and Villar-López 2014). Organizational resources mediate the attribute of innovation–adoption decision linkages in organizations. Such a conceptualization is consistent not only with the information–motivation–behavioral skill model, initially focused on the adoption of behaviors by individuals (Fisher et al. 2002), but also with the awareness–motivation–capability model, widely employed by scholars in management research for analyzing different firms' behaviors and actions (Chen 1996; Arend 2014). The latter model specifically stems from the sociocognitive research field (Dutton and Jackson 1987) and assumes that, due to information capacity constraints, organizations filter external information selectively. Since organizations tend to be attentive to salient behaviors offering superior net benefits, the latter are more likely to draw the organization's limited attention and to stimulate, via learning processes, the adequacy of resources to support the adoption of the behaviors mentioned (Livengood and Reger 2010).

Concerning the attributes of the relationship between innovations and an organization's resources, the relative advantage and compatibility (complexity) of an innovation are expected to likely be positively (negatively) associated with the availability of the organization's resources for adoption decisions. On the one hand, an innovation with superior attributes can potentially attract the organization's focus, which, in turn, will facilitate further enhancements in organizational resources once expertise in the new technology is gained (Kaplan 2008) and correlated learning curve benefits are grasped (Lieberman and Montgomery 1988). In the same vein, additional resources are solicited by technological alternatives of low complexity and high compatibility, thanks to their limited causal ambiguity (Gallivan 2001).

Concerning organizational resource–adoption decision linkages in organizations, organizations' resources are expected to be positively related to adoption decisions.

More current or potential organizational resources, such as research and development and human and marketing resources, are associated with superior confidence that innovation adoption by an organization will be successful and will facilitate the achievement of organizational goals (Tsai et al. 2010; Camisón-Zornoza and Villar-López 2014). Moreover, abundant or increasing resources imply that an innovation, once adopted, will be more easily provide profits for the adopting entity, via developed absorptive capacities (Cohen and Levinthal 1990). Furthermore, unconstrained resources provide an organization a buffer against difficulties associated with an innovation's adoption and subsequent implementation, consequently favoring innovation adoption decisions. At the same time, due to the low appropriability of externally generated innovations, more available resources tend to enhance the firm's combinatorial possibilities to match the resources mentioned with an innovation to adopt. Such expanded combinatorial possibilities permit an organization to develop specific composite complementary resources (Teece 1986; Gómez and Vargas 2012) and to erect barriers to imitation (Rivkin 2000). As an effect, a greater amount of resources is likely to increase the potential value that an organization can extract from a new technology, which, in turn, will foster its adoption.

Finally, this study argues that relative advantage–, compatibility–, and complexity–adoption decision linkages in organizations are likely to be weakened by the adequacy of organizational resources. Indeed, it has been observed that what an organization does with constrained resources cannot fully capture an innovation's potential benefits (Brynjolfsson et al. 2002). Thus, an innovation with significant attributes can benefit a constrained organization very little and, consequently, its adoption is less likely (Camisón-Zornoza and Villar-López 2014). In the same vein, an organization experiencing greater resource endowments would envisage more and more potential complementarities between its resources and new technologies, even when characterized by low relative advantage and compatibility. Such improved complementarities can enhance organizational ability to both build barriers to imitation and appropriate the potential value of an innovation. Therefore, the attributes of innovations seem to influence adoption decisions via an association with the organization's resources availability or development; consequently, the latter is likely to facilitate adoption decisions regarding said innovations (Livengood and Reger 2010; Camisón-Zornoza and Villar-López 2014). The discussion leads to the following hypothesis.

H4 Relative advantage and compatibility (complexity) positively (negatively) influence organization's resources, which, acting as a mediating variable, affects adoption decisions in organizations.

2.3 Innovation life cycle

In the proposed framework, the innovation life cycle captures the influence of the timing of adoption (Rogers 1983; Waarts et al. 2002) on the relationships between both managers' behavioral preferences and adoption decisions and an organization's resources and its adoption decisions.

Concerning the behavioral preferences of decision makers, the two-stage model introduced by Tolbert and Zucker (1983) suggests that early adopters, in deciding whether to adopt an innovation, tend to rely on the evaluative components of their behavioral preferences (i.e., attitudes), whereas late adopters are focused on the social and control components (i.e., subjective norms and behavioral control). In adoption decisions, early and later adopters differ from each other in how they frame the behavior to be adopted. More precisely, early adopters (or, within the marketing literature, technology pioneers) tend to frame new technologies as opportunities to achieve a sustainable competitive advantage. Therefore, an innovation adoption is more strongly associated with the decision maker's attitude toward the innovation itself (Waarts et al. 2002). At the same time, due to their innovative profile, pioneers' preferences are less affected by pressures stemming from third parties (Crespo and del Bosque 2008) or by a decision maker's behavioral control over the new technology (Dutton and Jackson 1987; Kennedy and Fiss 2009). Later adopters, instead, are inclined to frame an innovation as a threat to their organizations. Adoption decisions are thus driven by the need to mitigate losses and risks. Late adopters even seem to be more sensitive to pressure from both other adopters and stakeholders, as well as to the behavioral control of alternatives before the adoption decision (Dutton and Jackson 1987; Kennedy and Fiss 2009). Consequently, the normative and control elements of a decision maker's behavioral preferences are likely to play a more prominent role in the innovation adoption decisions of later adopters than in those of earlier adopters (Kennedy and Fiss 2009). The discussion leads to the following hypothesis.

H5 The innovation life cycle moderates the behavioral preferences of decision maker–adoption decision linkages in organizations. The attitude–adoption decision associations are stronger for early adopters than for late adopters. Norm– and perceived behavioral control–adoption decision associations are expected to be weaker for early adopters than for late adopters.

Concerning an organization's resources, organizations possessing abundant resources have been observed to face risks and uncertainties associated with adoption decisions more easily, compared to constrained organizations (Levin et al. 1987; Waarts et al. 2002; Ozusaglam et al. 2018). In the early stages of the innovation life cycle, pioneers are exposed to greater risks and uncertainty than later adopters are. Although early adoption of an innovation can offer organizations a first mover advantage, sometimes first movers experience disadvantages and even faults (Lieberman and Montgomery 1988). Therefore, due to the significant exposure of early adopters to risks and uncertainty, greater resource endowments (particularly human and technical capital) tend to mitigate such exposure. As Rogers (1983) observed, "Being an [early adopter] has several prerequisites. These include control of substantial financial resources to absorb the possible loss owing to an unprofitable innovation and the ability to understand and apply complex technical knowledge." Conversely, later adopters are less sensitive to organizational resources, since, as the innovation diffuses, risk and uncertainty tend to attenuate, while the new technology undergoes commoditization, that is, the demand for resources to sustain its adoption decreases. Moreover, the wide spread of external complementary resources to organizations further reduces later adopters' need for organizational resources sustaining adoption decisions (Rogers 1983). Consequently, from the perspective of adoption decisions, the adequacy of an organization's resources turns out to be far more important for early adopters than for later ones (Wozniak 1987). The discussion leads to the following hypothesis.

H6 The innovation life cycle moderates resource–adoption decision relationships in organizations. Organizational resource–adoption decision associations are stronger for early adopters than for late adopters.

2.4 Control variables

Whether the results are affected by various research designs is controlled for, for robustness testing. In particular, the literature has pointed out that the potential influence of a decision maker on organizational behaviors varies from small to large (Bass and Stogdill 1990). Consider that, in the theory of planned behavior, the associations between the preferences of a decision maker and adoption decisions imply that the decision maker is able to choose whether to adopt a given behavior (Ajzen 1991). Therefore, the greater the influence of the decision maker on organizational behaviors, the greater the influence of the decision maker's behavioral preferences on adoption decisions. To control for a decision maker's influence on organizational behaviors, two moderating variables are introduced: a) the hierarchical position of the decision makers responsible for adoption decisions and b) the size of the relevant organization (Miller and Friesen 1982; Ettlie 1983). In the same vein, given remarkable differences in the tangibility of the output, the timing of consumption, and information processing needs, as well as interorganizational relationships, empirical estimates drawn on organizations sample from non-service industries can differ from those sampled from service industries (Damanpour 1991). Accordingly, the distinction between service and non-service organizations is captured and its impact on empirical estimates controlled for. Moreover, in the view of neoinstitutional theory (Powell and DiMaggio 2012), organizations are considered to be embedded in an institutional environment, composed by regulative, normative, and cognitive elements (Scott 2001). This study controls for the effects on estimates of the regulative dimension of the institutional environment, that is, the rules of the game and their enforcement, including political, legal, and economic provisions (North 1990). Finally, the research methods employed matter for empirical estimates (Tornatzky and Klein 1982; Mitchell 1985). Differences in methods in studies are therefore accounted for and their influence on empirical estimates is evaluated.

3 Method

Moving away from the systematic literature review method proposed by Wolfswinkel et al. (2013), this study identifies the factors related to categories and constructs forming its conceptual framework from current theories and research (Montazemi and Qahri-Saremi 2015). Next, univariate meta-analytical regression and structural equation modeling techniques are combined to meta-analytically test the associations proposed by the framework in question.

3.1 Literature review method

In reviewing the literature, consistently with Wolfswinkel et al. (2013), various steps were followed: defining the sample of studies, including the definition of the criteria for inclusion, a search for primary pertinent empirical studies, and the selection of those matching the selection criteria; analyzing these empirical studies; and, finally, synthesizing the associations between theoretical constructs as identified by the adopted framework.

3.1.1 Defining the sample of studies

While defining the sample of studies in the meta-analysis, the main online bibliographic databases (i.e., ABI/INFORM Global, Business Source Premier, IEEExplore, ISI Web of Knowledge, JStore, ProQuest, Science Direct, Google Scholar, Emerald, and Scopus) were queried. Different variations of *organization* (e.g., *company, enterprise, firm*), *adoption* (e.g., *adopter, intention to adopt, use*), and *innovation* (e.g., *new technology, information system, computer-assisted manufacturing, e-commerce*) were used as search terms. To control for publication bias (Begg 1994), the first search wave was complemented by a bottom-up approach focused on literature reviews (Frambach and Schillewaert 2002; Crossan and Apaydin 2010; Anderson et al. 2014) and published meta-analyses (Damanpour 1991; Jeyaraj et al. 2006; Hameed et al. 2012; Weigel et al. 2014). Study cross-references were further analyzed via a two-way "snowballing" process: through the use of Google Scholar and the ISI Web of Knowledge, all citations included in the sample studies were backward-traced, while all papers quoting the former were forward-traced. Finally, scholarly books and PhD theses were sought; requests for working papers and forthcoming studies were also sent. The initial search yielded 862 primary studies broadly addressing the adoption of innovations in organizations.

The initial sample of studies was further analyzed to select those manuscripts considered eligible for this study. Following Damanpour (1991) and Tornatzky and Klein (1982), the following criteria for inclusion were assumed: (1) the dependent variable is the adoption of innovations; (2) the adoption decision concerns an innovation used by an organization as a whole and/or by its sub-organizational units; (3) at least one attribute of innovations that is expected to be associated with innovation adoption in organizations is considered; (4) data about the adopting organizations are available; and (5) the information and data needed to evaluate the correlation coefficients between the constructs in Fig. 1 are available (Schmidt and Hunter 2004).

These inclusion criteria detected 1038 correlations from 185 empirical studies, for a total sample size of 36,547. The full list of manuscripts covered by the meta-analysis is available as an electronic companion on the journal's webpage.

3.1.2 Analyzing the sample of studies

In the sample studies, many variables with the same meaning but different labels were observed, as well as variables with comparable labels, even if differently conceptualized. Consequently, the robust coding procedure suggested by Bullock and Svyantek (1985), widely used in meta-analytic research (Damanpour 1991; Bauer et al. 2007; Chen et al. 2010), was adopted. In short, four experts independently coded the variables in the study's conceptual framework, with an average inter-rater agreement of 96%.

At the beginning of the coding process, the experts were instructed to control for the fact that the behavioral preferences are referred to the decision makers responsible for the adoption decision of the relevant organization. Studies on behavioral preferences at a group level were excluded, since the extension of behavioral preferences to a group is not consistent with their theoretical underpinnings. Some studies were further noted to capture a decision maker's attitudes via the performance outcome of an innovation (e.g., see Marcati et al. 2008; Nasco et al. 2008). Such operationalization of attitude was excluded, for it mirrors the features of an innovation (as expressed by its attributes), thus possibly inflating the mediator–adoption decision linkage (Fiedler et al. 2011). In the same vein, the variables considered to capture the concept of resources were controlled for and classified under the label *organization's resources* or *perceived behavioral control* when specifically reference was made to an organization or decision maker, respectively.

Concerning adoption decisions, empirical works were excluded that focused on the diffusion of innovations and the cumulative number of new technology adopters in a certain context (Swanson 1994), on post-adoption decisions (e.g., Lefebvre et al. 1996), or on a manager's degree of satisfaction about new technologies that have already been adopted (e.g., Thong 2001). Finally, studies with adoption decision operationalization overlapping the operationalization of the attributes of a new technology (e.g., Gupta et al. 2013) were excluded.

The data necessary for the moderation analysis were collected. Adoption timing was captured following Westphal et al. (1997) and the year in which the empirical analysis of a study was performed was recorded. Evidently, adoption in early (later) years is a proxy for early (late) adoption. However, a technology can be diffused in various geographic contexts to different extents. Accordingly, on the one hand, technologies were grouped into homogeneous clusters. More precisely, by relying upon the so-called dual-core theory of innovation, the distinction was made between administrative and technical innovations (Daft 1978). Administrative technologies involve organizational structure and administrative processes (e.g., activity-based costing, balanced scorecards), while technical innovations encompass new technologies related to the core activities of an organization (Kimberly and Evanisko 1981; Damanpour 1991; Camisón-Zornoza et al. 2004). Within the category of technical innovations, the distinction between information and communication technologies (e.g., e-commerce, e-business, customer relationships management, enterprise resource planning) and other technologies (i.e., agriculture technologies, production technologies, and green technologies) was introduced. Information and communication technologies imply the use of the Internet and related technologies to support any activity involving information and knowledge, as well as to exchange goods or services with customers and suppliers (Lefebvre et al. 2005; Damanpour et al. 2009). On the other hand, the geographic dimension of the diffusion of innovations was controlled for by recording for each sample study the continent from which the adoption decision data were acquired.

Regarding the control variables, a manager's hierarchical position was determined by considering the notion of top managers proposed by Hambrick and Mason (1984). In this vein, for each study, the ratio of the sample's top managers to the total number of sample managers (i.e., the percentage of top managers) was calculated. The number of employees is considered a measure of organizational size. The analysis accounted for the distinction between non-service industries (e.g., manufacturing, agricultural, construction) and service industries (e.g., retail, financial services, health care) and calculated for each study the percentage of sample organizations not belonging to service industries. Each study was also associated with the country in which the adopting organizations operated and, then, with a country measure of the institutional/governmental level of quality, based on the index developed by Kaufmann, Kraay, and Mastruzzi (2010). This measure includes six dimensions (i.e., voice and accountability, political stability, government effectiveness, regulatory quality, rule of law, control of corruption) and ranges between -3 (very low quality of governance institutions) and $+3$ (very high quality of governance institutions).

Following Tornatzky and Klein (1982) and Mitchell (1985), further data were collected on the specific settings employed by the empirical studies, particularly the following: the sample type (convenience or random), the response rate, the percentage of adopters in the sample organizations, tests of differences between respondents and non-respondents, methods of gathering data (i.e., mailed questionnaire, on-line survey, face-to-face interview), tests for content, convergent and discriminant validity, similarity in the assessment of dependent and independent variables, and the nature of the dependent variable (i.e., intention to adopt, expectation to adopt, or adoption). After data were collected on the specific settings of the research, with the exception of the response rate and the percentage of adopters in the sample organizations, each study underwent Boolean coding, that is, a study was coded as one if a specific setting was employed and zero otherwise. Finally, the publication's outlet (i.e., journal, conference proceedings, book or book section, PhD thesis) was recorded, as well as its Social Science Citation Index impact factor.

3.1.3 Synthesized constructs

Table 1 summarizes the constructs employed in the study's meta-analysis, indicating factor definitions, sample measures derived from previous empirical studies and

Table 1 Description of key constructs in the proposed conceptual framework

Key construct	Definitions	Sample measures	Sample items
Attributes of innovations			
1. Relative advantage	The degree to which an innovation is perceived as being better than the idea it supersedes (Rogers 1983: p. 213)	Relative advantage (Jarrett 2003; Seyal and Rahman 2003; Gu et al. 2012) Perceived usefulness (Gamal Aboelmaged 2010; Heyder et al. 2012; Daryanto et al. 2013) Perceived benefits (Quaddus and Hofmeyer 2007; Ghobakhloo and Tang 2013; Kurnia et al. 2015)	"Increases sales and enlarges market share for our company" "Reduces costs for our company" "Enables the development of new businesses for our company"
2. Compatibility	The degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters (Rogers 1983: p. 226)	Compatibility (He et al. 2006; Lin and Ho 2011; Henderson et al. 2012) Technological compatibility (Uzoka and Ndzinge 2009; Weng and Lin 2011)	"Highly compatible with our earlier experience of new technology adoption" "Highly compatible with the values, beliefs, and business needs of our organization" "Compatible with the activities of our suppliers and partners"
3. Complexity	The degree to which an innovation is perceived as relatively difficult to understand and use (Rogers 1983: p. 231).	Complexity (Hung et al. 2010; Gu et al. 2012; Hsing Wu et al. 2013) Ease of use (reverse coded) (Jarrett 2003; Li et al. 2011; Arpaci 2013)	"Complex because the innovation is composed of many components" "Interaction with the innovation is difficult" "The innovation is easy to use (reversed)"
Preferences of managers			
4. Attitude	Refers to the degree to which an individual has a favorable or unfavorable evaluation or appraisal of the behavior under examination (Ajzen 1991: p. 188)	Attitude (Harrison et al. 1997; Riemenschneider et al. 2003; Gamal Aboelmaged 2010) Top management attitude (Thompson et al. 2009; Lin et al. 2012)	"Adopting the new technology would be ineffective/effective for my organization" "Adopting the new technology would be bad/good for my organization" "Adopting the new technology would be foolish/wise for my organization"

Table 1 (continued)

Key construct	Definitions	Sample measures	Sample items
5. Norm	Reflects perceived social pressure to perform or not to perform the behavior under examination (Ajzen 1991: p. 188)	Subjective norm (Harrison et al. 1997; Riemenschneider et al. 2003; Xu and Quaddus 2012) External pressures (Tung and Rieck 2005; Alam and Noor 2009; Hossain and Quaddus 2015)	"Most who are important to my organization approve the adoption of the innovation" "Most who are important to my organization think my firm should adopt the innovation" "Most who influence the behavior of my organization think my firm should adopt the innovation"
6. Behavioral control	Refers to the availability of requisite opportunities to staff the behavior under examination (Ajzen 1991: p. 182)	Perceived behavioral control (Harrison et al. 1997; Riemenschneider et al. 2003; Hsu et al. 2014) Self-efficacy (Segaar et al. 2006; Jackson 2008; Lee and Larsen 2009)	"Capable of learning new technologies easily" "Capable of using new technologies" "Expert in the new technology"
Organization's resources			
7. Organization's resources	Refers to the availability of resources, like assets, capabilities, organizational processes, firm attributes, information, knowledge, controlled by an organization (Barney 1991)	Facilitating conditions (Leung 2005; Messerschmidt and Hinz 2013) Resources and capabilities (Aubert et al. 2012; Riyadh et al. 2012)	"Level of organization's knowledge" "Level of general skills and capabilities" "Level of previous experience"
Innovation adoption			
9. Adoption	It is a decision to make full use of an innovation as the best course of action available (Rogers 1983: p. 20)	Adoption (Thong 1999; Leung 2005; Jeon et al. 2006) Intention to adopt (Quaddus and Hofmeyer 2007; Daryanto et al. 2013; Martinez-Garcıa et al. 2013) Expectation to adopt (Hussin et al. 2008; Marcati et al. 2008; Lee and Larsen 2009)	"Adopted the new technology" "Intention to adopt" "Plan to adopt"

associated with such constructs, and the sample items adopted by the study while operationalizing each factor (see Table 1).

Consistently with the conceptual associations defined in the theory development previously noted, the aforementioned factors are linked to the attributes of the innovation–mediator/moderator–adoption decision relationships in organizations and their influences are tested according to the meta-analytical procedure.

3.2 Meta-analytical review procedure

Starting from the constructs and the underlying factors and their associations as identified in the proposed framework, this study employs a meta-analytical review procedure combining univariate meta-analytical regression and structural equation modeling techniques. The joint usage of these techniques offers several advantages, such as the stronger correction of sampling errors and greater precision in estimates, better consideration of construct interdependence (Cheung and Chan 2005), and attenuated risks of the so-called mono-method bias (Viswesvaran and Ones 1995; Shadish 1996; Colquitt et al. 2000).

3.2.1 Univariate analysis

Following Chen et al. (2010) and Damanpour (1991), this study refers to univariate analysis for both the testing and mediation testing of the main effect.

In testing the main effect, the correlation coefficients were intended to be a measure of the effect's magnitude. For studies employing logistic regression models or discriminant analysis, correlation coefficients are derived by using available conversion formulas (Fern and Monroe 1996; Lau et al. 1999; Lipsey and Wilson 2001). As a robustness analysis, coefficients calculated from either logistic regression or discriminant analysis were excluded and consistent results were observed. The correlation coefficients were then corrected for sample size and reliability. The sampling error observed and residual variances were then calculated. As suggested by Hunter and Schmidt's (2004), the corrected means and residual variances were also estimated, as well as the 95% interval unadjusted for range restriction (Gooding and Wagner 1985; Damanpour 1991; Camisón-Zornoza et al. 2004; Chen et al. 2010). The salience of each corrected correlation coefficient was estimated by means of the popular 0.30 rule (Cohen and Cohen 1983). The publication bias was assessed via estimation of the file drawer N (Rosenthal 1979) and the eligibility bias was assessed via the normal quantile plot method (Wang and Bushman 1999).

Concerning the mediation analysis, partial correlation coefficient analysis (Blalock 1961) and the Sobel test (1982) were used. In the partial correlation coefficient analysis, a mediating effect implies that, in the attributes of innovation–adoption decision associations, the partial correlation coefficient (controlling for mediators) is lower than the corresponding original correlation coefficient, uncorrected for mediating variables (Blalock 1961). A significant (negligible) mediation effect occurs when the partial correlation coefficient is equal to zero (is equal to the original unmediated correlation coefficient). If the original unmediated correlation is higher than the partial correlation and its significance test differs from zero, then a partial intervening mediation effect (Gajendran and Harrison 2007) is detected. For the Sobel test, the total unstandardized indirect effect (i.e., estimated by the product of the correlation coefficients associated with the innovation attribute–mediator and mediator–adoption paths) and its significance level were estimated. In such an estimation, corrected standard errors were based on the multivariate delta method suggested by Bobko and Rieck (1980) and used in various empirical analysis (Cheung 2009); that is, they were calculated directly from the correlation coefficients. Finally, as a measure of the total sample size, the harmonic mean of the sample sizes was employed for each of the involved meta-analytic correlations (Viswesvaran and Ones 1995).

3.2.2 Meta-analytical regression

Regarding the influence of moderators and control variables on the estimates, the need for such an analysis was tested according to the 75% rule (Gooding and Wagner 1985) and the χ^2 homogeneity test (Schmidt and Hunter 2004). Second, only those associations complying with the aforesaid rules were considered for moderation analysis via a meta-analytical regression analysis (Lipsey and Wilson 2001). When there is significant unexplained heterogeneity in the estimates, fixed effects models, although more conservative, tend to greatly increase the possibility of rejecting the true null hypothesis (Higgins and Thompson 2004). Thus, following Lipsey and Wilson (2001), the extent of the unexplained heterogeneity in estimates was estimated. More precisely, for each of the mediator–adoption decision associations, a regression was run by using all available moderating and control variables as covariates. Since all the associations considered show an important residual component of unexplained heterogeneity, a mixed effects model was relied upon to test the influence of the moderating and control variables on the empirical estimates (Lipsey and Wilson 2001). The same procedure was additionally implemented to test the effects on estimates of variations in the sample organizations' characteristics and in the research settings adopted by the empirical studies. To evaluate the significance of the estimates, the adjusted R-squared, F-test, and t test values for the beta coefficients were calculated (Lipsey and Wilson 2001).

3.2.3 Structural equation modeling

A structural equation model is introduced to evaluate the associations illustrated in Fig. 1. From primary studies, the covariance matrix or, if unavailable, the variances of the considered variables are obtained. These variances are used to transform the correlation coefficients into covariances. Thus, a pooled covariance matrix is defined and such a matrix is used to estimate structural relationships (King and He 2006). The covariance matrix is then analyzed in a random effects model by using the maximum likelihood estimation available in the statistical application Stata 13. As a measure of the total sample size, the harmonic mean is calculated based on the number of observations associated with the constructs of the study (Viswesvaran and Ones 1995; Colquitt et al. 2000). The model fit is estimated by measuring the root mean squared error of approximation (RMSEA), the comparative fit index (CFI), and the standard χ^2 statistic (Bentler 1990). Due to the constraints arising from the available data, the structural equation model is focused on the analysis of the main and mediation effects. As Cheung and Chan (2005) warned, because of the primary data employed in the meta-analysis, poor results—in terms of the RMSEA (i.e., lower than 0.08) and CFI (i.e., greater than 0.90)—do not necessarily imply an inferior fit of the research model. Thus, as a robustness analysis, an alternative procedure was adopted: for each individual study, the path coefficients are estimated on the covariance matrix and then meta-analyzed. Consistent results are thus observed.

4 Results

4.1 Descriptive statistics

Table 2 shows the average-adjusted correlation coefficients among all the constructs in the proposed framework, along with the standard deviation of observations, the number of observations, and sample sizes.

Table 2 allows the multicollinearity between the constructs in the study's conceptual framework to be assessed. The magnitudes of the associations, though high, is well below the recommended level of 0.65 (Tabachnick and Fidell 1996). At the same time, the variance inflation factor for multicollinearity (Montazemi and Qahri-Saremi 2015) is calculated. Observed values for the variance inflation factor range from 1.03 to 1.73, that is, well below the critical level of 1.87 (Meyers et al. 2006). Consequently, the estimates do not contradict the premise of the independence of the constructs.

4.2 Attributes of innovation–adoption decisions relationships in organizations

Table 3 shows the results for the meta-analysis on the attributes of innovation–adoption decision linkages.

The attributes of innovations are associated with innovation adoption with sufficient consistency and directionality across different studies, organizations, and contexts. Moreover, the results appear to be robust with regard to the number of null studies, such that the observed effects zero out (mean file drawer N = 86,131). Consequently, relative advantage, compatibility, and complexity matter for adoption decisions in organizations. In terms of signs, relative advantage and compatibility (complexity) tend to foster (hamper) adoption decisions. According to the 0.30 rule, all the considered attributes of innovations turn out to be salient determinants of adoption decisions in organizations (see also Tornatzky and Klein 1982). The combined direct effect of the salient attributes of innovations on adoption decisions are further calculated as estimated by the structural equation model. The path coefficient is positive, greater than obtained by the 0.30 rule, and highly significant. This result suggests synergistic combined effects between the considered attributes of an innovation in triggering an adoption decision. In short, the well-grounded theoretical associations between the considered attributes of innovations and adoption decisions in organizations are confirmed by the evidence derived from the meta-analysis.

Table 2 Average reliability-adjusted intercorrelations between constructs

	1	2	3	4	5	6	7	8
1. Relative advantage	[0.882]							
SD of correlations	–							
Number of correlations	–							
Sample size	–							
2. Compatibility	0.487	[0.869]						
SD of correlations	0.049	–						
Number of correlations	40	–						
Sample size	7918	–						
3. Complexity	−0.381	−0.312	[0.855]					
SD of correlations	0.056	0.084	–					
Number of correlations	61	30	–					
Sample size	12,793	5639	–					
4. Attitude	0.513	0.452	−0.351	[0.905]				
SD of correlations	0.043	0.057	0.066	–				
Number of correlations	26	7	15	–				
Sample size	5610	1822	3368	–				
5. Norm	0.373	0.314	−0.212	0.502	[0.847]			
SD of correlations	0.046	0.041	0.062	0.042	–			
Number of correlations	62	18	27	20	–			
Sample size	11,443	3290	5213	4300	–			
6. Behavioral control	0.495	0.330	−0.502	0.579	0.408	[0.847]		
SD of correlations	0.055	0.016	0.016	0.075	0.038	–		
Number of correlations	16	2	6	10	15	–		
Sample size	2999	484	1431	1837	2605	–		
7. Organization's resources	0.359	0.413	−0.373	0.444	0.314	0.540	[0.839]	
SD of correlations	0.036	0.042	0.043	0.041	0.044	0.043		
Number of correlations	50	23	30	7	32	4		
Sample size	9825	4894	6187	1613	5530	726		
8. Adoption	0.392	0.359	−0.318	0.538	0.378	0.409	0.403	[0.898]
SD of correlations	0.034	0.032	0.034	0.032	0.043	0.024	0.029	
Number of correlations	155	67	91	35	88	25	69	
Sample size	31,249	14,171	20,366	6817	16,077	4527	14,276	

Entries on the diagonal in brackets are the weighted mean Cronbach alpha coefficients. The *p* values for the correlation coefficients are all lower than 0.05

SD standard deviation

4.3 Attributes of innovation–mediating variables relationships in organizations

The attributes of innovation are associated with both the behavioral preferences of managers and organizations' resources necessary to staff the innovation to be adopted (see Table 3). The findings appear to be robust with regard to the number of

Table 3 Descriptive statistics and influences of the attributes of innovation and mediators on adoption decisions

	Number of raw effects	Total sample size	Mean correlation coefficients	Weighted mean correlation coefficients [beta]	Corrected mean correlation coefficients	Observed variance correlation coefficients [SE]	t-Value (df) [z-values]	Explained variance (%)	95% credibility interval	File drawer N (two-tailed test)	χ^2 homogeneity test (df)
Attributes of innovations → adoption											
Relative advantage → adoption	155	31,249	0.34*	0.34*	0.39*	0.03	23.04 (154)	0.16	0.41	190,569	1195.94 (154)
Compatibility → adoption	67	14,171	0.31*	0.31*	0.36*	0.03	14.01 (66)	0.16	0.41	28,267	504.88 (66)
Complexity → adoption	91	20,366	−0.26*	−0.28*	−0.32*	0.03	14.21 (90)	0.15	−0.42	39,558	740.19 (90)
Attributes → adoption	–	1379	–	[0.66*]	–	[0.03]	[18.68]	–	–	–	–
Attributes of innovations → decision maker–level mediators											
Relative advantage → attitude	26	5610	0.48*	0.46*	0.51*	0.04	11.17 (25)	0.11	0.47	12,762	313.10 (25)
Compatibility → attitude	7	1822	0.42*	0.40*	0.45*	0.06	4.39 (6)	0.07	0.57	830	126.57 (6)
Complexity → attitude	15	3368	−0.33*	−0.31*	−0.35*	0.07	4.67 (14)	0.07	0.61	2356	248.93 (14)
Relative advantage → norm	62	11,443	0.34*	0.32*	0.37*	0.05	11.83 (61)	0.13	0.50	29,286	590.81 (61)
Compatibility → norm	18	3290	0.23*	0.27*	0.31*	0.04	5.65 (17)	0.14	0.47	1319	142.27 (17)
Complexity → norm	27	5213	−0.19*	−0.18*	−0.21*	0.06	3.82 (26)	0.09	0.60	2577	332.30 (26)
Complexity → behavioral control	6	1431	−0.44*	−0.44*	−0.50*	0.02	8.66 (5)	0.38	−0.24	633	27.97 (5)
Attributes → mediators	–	1379	–	[0.85*]	–	[0.03]	[32.87]	–	–	–	–
Attributes of innovations → organization-level mediators											
Relative advantage → organization's resources	50	9825	0.30*	0.31*	0.36*	0.04	11.48 (49)	0.16	−0.43	15,689	385.15 (49)
Compatibility → organization's resources	23	4894	0.31*	0.35*	0.41*	0.04	8.30 (22)	0.13	−0.49	4725	226.53 (22)
Complexity → organization's resources	30	6187	−0.30*	−0.32*	−0.37*	0.04	8.43 (29)	0.14	−0.50	6807	289.03 (29)

Table 3 (continued)

	Number of raw effects	Total sample size	Mean correlation coefficients	Weighted mean correlation coefficients [beta]	Corrected mean correlation coeffi-cients	Observed variance correlation coefficients [SE]	t-Value (df) [z-values]	Explained variance (%)	95% credibility interval	File drawer N (two-tailed test)	χ^2 homogene-ity test (df)
Attributes → mediators	–	1379	–	[0.61*]	–	[0.04]	[15.28]	–	–	–	–
Mediators → adoption											
Attitude → adoption	35	6817	0.49*	0.48*	0.54*	0.03	15.89 (34)	0.18	0.38	21,018	287.78 (34)
Norm → adoption	88	16,077	0.34*	0.32*	0.38*	0.04	14.36 (87)	0.14	0.51	49,034	776.6 (87)
Behavioral control → adoption	25	4527	0.36*	0.36*	0.41*	0.02	11.42 (24)	0.24	0.31	5188	125.34 (24)
Organization's resources → adoption	69	14,276	0.34*	0.34*	0.40*	0.03	16.68 (68)	0.20	0.39	35,645	456.7 (68)
Mediators → adoption	–	1379	–	[0.58*]	–	[0.02]	[25.84]	–	–	–	–

The harmonic mean of the total sample size and standardized beta coefficients are reported for the structural equation model. All N values greatly exceed the critical N, calculated as $N_{crit} = 5N + 10$ (Rosenthal 1991). According to the Homogeneity test, correlation coefficients are not cross sectionally consistent. The model associated with the attributes–adoption linkages has the following indexes: $\chi^2(2) = 27.29$, RMSEA = 0.09, $p < 0.01$, CFI = 0.96. Concerning the behavioral preferences of managers, the model associated with the attributes–mediator linkages has the following indexes: $\chi^2(8) = 403.90$, RMSEA = 0.18, $p < 0.01$, CFI = 0.81. Concerning the organization's resources, the model associated with the attributes–mediator linkages has the following indexes: $\chi^2(2) = 40.58$, RMSEA = 0.11, $p < 0.01$, CFI = 0.93. The model associated with the mediators–adoption linkages has the following indexes: $\chi^2(5) = 144.72$, RMSEA = 0.14, $p < 0.01$, CFI = 0.92. SE is standard error

*$p < 0.05$

null studies needed to zero out the observed effects (mean file drawer N = 7109 and N = 9073 for decision makers and organization-level mediators, respectively).

The correlation coefficients of the attributes of innovation–mediator associations are significant and their signs are coherent with H1 through H4, without exception. As hypothesized, across various mediators, relative advantage and compatibility (complexity) positively (negatively) impact potential mediators. In terms of magnitude, relative advantage has the largest positive impact on decision maker–level mediators. Compatibility has the greatest positive impact on the organization-level mediator, suggesting that greater levels of compatibility tend to have a strong positive influence on organizations' resources. The path coefficients are positive, greater than for the 0.30 rule, and highly significant; they also indicate the joint effects of the attributes of innovations on the behavioral preferences of decision makers, as well as on organizations' resources.

4.4 Mediators–adoption decisions relationships in organizations

The behavioral preferences of managers and organizations' resources are likely to be associated with adoption decisions in organizations. The average sample-weighted reliability-adjusted correlation among mediators and adoption decisions equals 0.43. The findings appear to be robust with regard to the number of null studies needed to zero out the observed effects (mean file drawer N = 27,721).

Generally, decision makers' behavioral preferences as well as organizations' resources matter for the adoption of innovation. Their combined effect on adoption decisions, as captured by the structural equation model, is positive, greater than for the 0.30 rule, and highly significant. This result suggests that decision makers' behavioral preferences and organizations' resources could produce synergistic effects. The chances of an innovation being adopted tend to increase when the new technology is able to simultaneously stimulate the favorable behavioral preferences of managers and the development of the necessary organizational resources to support such an innovation.

4.5 Attributes of innovation–mediator–adoption decisions relationships in organizations

The mediation effects in the attributes of innovation–adoption decision linkages are further evaluated.

Table 4 provides empirical evidence that, once the preferences of managers and organizations' resources are controlled for in the attributes of innovation–adoption decision linkages in organizations, the resulting corrected partial correlation coefficients are always lower than the original unmediated correlations between the variables considered. Moreover, according to the Sobel test, the total standardized mediation effects for the considered variables are significant, without exception (see Table 4). As a robustness test, for each of the hypothesized mediation effects, according to the structural equation model (Brown 1997), the direct effects of the

Table 4 Relationships between attributes of innovation and adoption decisions after controlling for mediators

	Attitude		Norm		Behavioral control		Organization resources	
	Corrected mean partial correlation coefficients	Total unstandardized mediation effect [SE]	Corrected mean partial correlation coefficients	Total unstandardized mediation effect [SE]	Corrected mean partial correlation coefficients	Total unstandardized mediation effect [SE]	Corrected mean partial correlation coefficients	Total unstandardized mediation effect [SE]
Relative advantage → adoption	0.16* (8405)	0.23* [0.008]	0.29* (16,521)	0.10* [0.005]	–	–	0.28* (14,718)	0.11* [0.004]
Compatibility → adoption	0.15* (3916)	0.21* [0.008]	0.27* (6869)	0.09* [0.004]	–	–	0.23* (8697)	0.13* [0.006]
Complexity → adoption	−0.15* (6089)	−0.17* [0.008]	−0.25* (9897)	−0.07* [0.004]	−0.15* (3097)	−0.17* [0.012]	−0.19* (10,685)	−0.12* [0.006]

The significance of the partial correlations is evaluated against the harmonic mean of the sample sizes (in parentheses)

*$p < 0.05$

attributes of innovations on adoption decisions are calculated without controlling (unmediated) and controlling (mediated) for mediators. The analysis results, available on request from the authors, show that the absolute magnitudes of the unmediated path coefficients are greater than those of the mediated path coefficients. It is an additional empirical evidence of the mediating role of both the behavioral preferences of managers and organizations' resource on the attributes of innovation–adoption decision associations in organizations. Finally, in both the pairwise and structural equation modeling analyses, the corrected partial correlation coefficients are, again, always significant, thus revealing partial mediation effects.

4.6 Moderation analysis

In the data, the explained variance of the associations between mediators and adoption decisions is well below the threshold of 75%, with significant homogeneity tests. Given these empirical findings, a meta moderation regression with mixed effects is introduced (Lipsey and Wilson 2001).

Table 5 Influence of the innovation life cycle on mediators–adoption decision linkages

	Attitude → adoption	Norm → adoption	Behavioral control → adoption	Organization's resources → adoption
Year	0.0083 (0.0063)	−0.0031 (0.0050)	0.0233* (0.0089)	−0.0069 (0.0040)
Agriculture technologies	−0.1804 (0.0996)	−0.0982 (0.1227)	−0.1548 (0.1097)	−0.1712 (0.1405)
Green technologies	−0.2175* (0.0757)	0.0045 (0.0762)	−0.1869 (0.1028)	0.1086 (0.1150)
Administrative technologies	–	–	0.1981 (0.3143)	−0.2413 (0.1567)
Production technologies	−0.1409 (0.0999)	0.0134 (0.01090)	−0.2878 (0.2043)	−0.0585 (0.1245)
Asia	0.1722 (0.1607)	−0.1278 (0.0787)	0.1978 (0.2011)	−0.1467 (0.0782)
Australia	0.4447* (0.2852)	−0.0030 (0.1240)	–	0.0219 (0.1378)
Europe	0.3547* (0.2356)	−0.0235 (0.1002)	0.5058 (0.4406)	−0.1111 (0.0941)
North America	0.2178 (0.1972)	−0.0663 (0.0985)	0.1651 (0.2251)	−0.1466 (0.1128)
Constant	−16.3462 (12.5740)	6.6249 (5.0961)	−46.5265* (35.7896)	14.3254 (8.0934)
Adj R^2	15.34	2.72	44.26	3.12
df	28	79	11	67
F-value	1.70	0.69	2.46	1.25

Standard errors of estimates are in parentheses. Dummies for information and communication technologies and Africa were omitted

$*p < 0.05$

Concerning the behavioral preferences of managers, the premise that their influence on adoption decisions in organizations varies when moving from late to early adoptions is confirmed, but only for behavioral control beliefs. The same effect is not observed for attitudes and norms. Thus, H5 is partially confirmed by the evidence. At the same time, the effects of the stage of the innovation life cycle at which an adoption decision occurs are not significant for the association between organizations' resources and adoption decisions. Thus, H6 is not confirmed (see Table 5).

4.7 Robustness

Since some studies consider both the preferences of managers and organizations' resources as independent variables, this study employs its analytical regression model and compares the equation-level goodness of fit of two models (i.e., the overall *R*-squared value). The first model considers the attributes of innovations, the preferences of managers, and organizations' resources to be directly associated with adoption decisions in organizations and the model's overall *R*-squared value is 0.310 (overall model $\chi^2(7)=513.07$, $p<0.05$). The second model considers both the preferences of managers and organizations' resources as mediators of the attributes of innovation–adoption decision associations in organizations and the model's overall *R*-squared value is 0.538 (model $\chi^2(25)=2800.71$, $p<0.05$). Though both models are significant, the latter—adopted in this study—has better goodness of fit than the former.

Given the proposed conceptual framework, the possibility of empirical estimates being affected by omitted variables is evaluated. A meta-analytical regression with mixed effects is therefore run (Lipsey and Wilson 2001) for each mediator–adoption decision association on the considered control variables. The results of analysis only show that an organization's resource–adoption decision association is positively influenced in the meta-analytical regression model with mixed effects (adjusted *R*-squared = 39.67; $df=22$; $F=4.07$), by both organizational size ($\beta=0.00006$; standard error = 0.00003; $p<0.10$) and the quality of the country's institutions ($\beta=0.03986$; standard error = 0.02087; $p<0.10$). This result implies that greater resources facilitate the adoption of innovations to a greater extent in larger organizations and in countries characterized by higher levels of institutional/governmental quality.

Regarding the specific settings employed in the studies (adjusted *R*-squared = 72.82; $df=17$; $F=2.59$), there is evidence that the norm–adoption decision linkages are influenced by the nature of the sample ($\beta=-0.38497$; standard error = 0.08205; $p<0.10$); in particular, the magnitude of the empirical estimates decreases in the move from a convenience sample to a random sample of organizations. In the same vein, for the relationship between organizations' resources and adoption decisions (adjusted *R*-squared = 16.49; $df=40$; $F=0.60$), a discriminant validity test positively influencing the empirical estimates ($\beta=0.28244$; standard error = 0.21683; $p<0.10$) is found. However, despite the observed variations in the magnitudes of the correlation coefficients, their direction and significance levels remain consistent with the main results, thus confirming the robustness of the empirical estimates. A meta-regression analysis is additionally performed by considering, in the mediator–adoption linkages, the following control variables: the publication type (i.e., published studies on peer-reviewed publications vs. other studies), the journal type (i.e., whether the journal is included in the 2010 Social Science Citation Index), and the journal's Social Science Citation Index impact factor. These variables are found to not have a significant influence on the main associations in the study framework.

This study further controls for publication and eligibility biases by conducting a quantile plot analysis (Wang and Bushman 1999). No significant deviation of the sample of correlation coefficients from the 95% confidence interval built around the normality line was observed. Even after outliers are removed from the sample, the findings remain substantially unaltered. A one-sample removed analysis is performed to assess the impact of each individual sample on the results (Borenstein et al. 2009). Consequently, the main findings hold. Detailed evidence, omitted here, is available from the authors on request.

5 Discussion and implications

This study takes a step back and (re-)evaluates and integrates the state of art on innovation adoption in organizations, thus suggesting a conceptual framework and a research approach that can lead to the greater generalizability of studies in this field. In this vein, this study attempts to provide theoretical and empirical grounds for the conditions influencing the adoption of innovations in organizations. Accordingly, this study introduced a systematic literature review on organizational innovativeness and simultaneously employed univariate analysis, meta-analytical regression, and structural equation modeling to capture empirical evidence on the paths or chains linking the attributes of innovations, mediating/moderating conditions, and adoption decisions in organizations.

5.1 Implications for theory

This study makes many contributions. It theoretically considered and empirically analyzed various conditions critically related to adoption decisions in organizations (Crossan and Apaydin 2010). Moreover, as often required in management research, the study contributes to the integration of different theories (Downs and Mohr 1976) in understanding the adoption of innovation in organizations. Specifically, on the one hand, it developed the idea introduced by Rogers (1983) that the attributes of innovation–adoption decision associations are mediated by intervening conditions. On the other hand, it identified as intervening conditions the behavioral preferences of decision makers (Ajzen 1991), as suggested by the theory of planned behaviors, and organizations' resources, as indicated by recent studies on the adoption of innovations (Camisón-Zornoza and Villar-López 2014) and the awareness–motivation–capability model (Chen 1996; Arend 2014). At the same time, the study attempted to combine micro and macro levels of analysis (Bamberger 2008).

In the conceptualization of the mediating variables, it integrated the individual-level model of the theory of planned behavior with the organization-level concept of the resources supporting the innovation to be adopted and with the environmental-level concept of the innovation life cycle. Consequently, it suggested that not only the behavioral preferences of decision makers are important to assume for an adoption decision, but also the availability of resources sustaining such a decision, as well as the timing of the adoption, which was found to moderate the mediator–adoption decision linkages in organizations.

The influence of the innovation life cycle on estimates was observed to matter for behavioral control beliefs. This study therefore suggests that, on the one hand, factors that could be relevant for early adopters' decisions might not be relevant for late adopters. On the other hand, factors that influence the adoption of innovations in organizations are not constant but tend to change over time with the diffusion of the innovations. The determinants of innovation adoption decisions in organizations are thus time dependent and the conditions that explain adoption decisions change over time (Waarts et al. 2002). The findings also revealed that the moderation effects of the innovation life cycle of an organization's attitude–, norm–, and resource–adoption decision associations are not significant. One explanation is "the low power of detecting true moderating effects in correlational data," since "field studies require as many as 10–20 times more observations than randomized experiments for detecting interactive influences that have the same effect size" (Harrison et al. 1997, p. 186). In addition, the presence of potential theoretical and empirical inconsistencies in the primary studies creates heterogeneity in the estimates (Lipsey and Wilson 2001). Therefore, this paper envisages the potential of future primary studies in theoretically considering the adoption of innovations as a dynamic process and empirically testing the specific role of the innovation life cycle as a moderating variable in the attributes of innovation–innovation adoption decision linkages in organizations.

Given the abundance of studies on the adoption of innovations in organizations, together with the calls of past reviews, Anderson et al. (2014) claimed a need for works aimed at integrating empirical findings across studies on the topic of innovation. By responding to that call, this study contributed to the meta-analysis and integration of studies on innovation adoption published over the last three decades. In this vein, the study offered consistent and strong empirical evidence of the relative advantage–, compatibility–, and complexity–adoption decision associations in organizations. It provided theoretical grounds and empirical evidence for the joint influence of behavioral preferences of managers and organizations' resources on the adoption of innovations in organizations. Partial empirical evidence on the relevance of the innovation life cycle or, from a marketing approach, the role of pioneers on empirical estimates was made available. In other words, the timing of adoption is likely to partially interfere with the behavioral preferences of manager–adoption decision linkages in organizations. Research settings were also found to impact empirical estimates, thus echoing Tornatzky and Klein's (1982) claim that research settings matter and scholars should carefully consider the problem of operationalizing both the adoption construct and its various antecedents and, more generally, meet the conditions for an ideal research setting in studying the adoption of innovations in organizations.

5.2 Implications for practice

This study has also implications for practice. Specifically, it suggested that a new technology to be adopted needs positive and valuable characteristics, in terms of relative advantage, comparability, and lower complexity, compared to available technological alternatives. At the same time, an adoption decision is made if the attributes mentioned promote changes in the behavioral preferences of the managers responsible for the adoption decision, as well as the development of an adequate amount of organizational resources related to the innovation adoption process. To capture the extent of the associations between the variables in the study's framework, the procedure developed by Rosenthal and Rubin (1982) was used and, on average and without considering synergistic effects among constructs and mediating/moderating conditions, innovations with superiors attributes (adoption probability = 0.68) were found to have far more chances of being adopted than innovations with inferior attributes (adoption probability = 0.32). Similarly, the chances of innovations being adopted greatly increases in cases in which a decision maker has established favorable behavioral preferences (adoption probability = 0.73) and an organization has adequate resources (adoption probability = 0.70) compared to cases in which the decision makers have unfavorable preferences (adoption probability = 0.27) or inadequate resources (adoption probability = 0.30).

Therefore, to sustain an innovation's diffusion, innovators should launch new solutions providing greater net benefits than available alternatives, facilitating decision makers' favorable preferences as well as the perceived adequacy of the organizational resources involved in the innovation adoption. In the same vein, policy makers can refer to the proposed conceptual framework to foster the diffusion of innovations among organizations. As an implication, investing just in the development of a new technology might be less effective in the absence of such influences on managers' preferences as well as on organizational resources. From a different perspective, this study also suggested that a business executive interested in preserving a competitive advantage could discourage the diffusion of a new technology by reducing its expected benefits for others via increased complexity and, simultaneously, making the technology highly specific, so that causal ambiguity arises and the need for resources as perceived by other organizations is increased.

6 Limitations

Together with the contributions of the meta-analytical study, the following main limitations were noted. This study has a correlational nature and most of the primary data come from self-reported behavior. Consequently, the sample of organizations considered, the specific research settings employed, and other heterogeneities that are not controlled for can co-vary with the variables considered here and contribute to determining the empirical estimates. However, this study attenuated the impact of these potential issues on the estimates by using mediating variables, which provide better evidence of a potential cause–effect chain; employing different methods to analyze the data; controlling for the research settings employed by studies; and regressing, as a robustness analysis, such specific settings on empirical estimates.

Another limitation concerns the aggregation of similar conceptual variables under the same construct. Table 1 shows that, for example, relative advantage is measured in the literature in terms of both perceived usefulness and perceived benefits. These conceptually similar variables obtained in this study under the same construct are often measured in different ways and can thus introduce heterogeneity into the empirical estimates. However, aggregation under the same construct with different operationalizations can lead to greater levels of content validity and, at the same time, reduce the one-measurement model bias. In others words, this study's approach allowed different and more comprehensive aspects of a concept to be encompassed.

The study also combined variables stemming from the micro level with the variables, instead of those stemming from the macro level. However, other relevant factors are not considered here because of the constraints arising from the available data.

A potential interaction can be envisaged between the behavioral preferences of decision makers and organizations' resources; such interactions are still controversial in the literature. On the one hand, the awareness–motivation–capability model suggests that the behavioral preferences of decision makers, while reflecting available information about a behavior to be adopted, impact adoption decisions via organizations' resources as a mediating variable (Livengood and Reger 2010). On the other hand, according to the information–motivation–behavioral skills framework, the effects on adoption decisions of the behavioral preferences of decisions makers are assumed to be partially mediated by available resources. Such mediation effects are also strengthened in the case of constrained resources, whereas specific, complementary skills and capabilities are required by the behavior to be adopted (Fisher et al. 2002). This is an important issue for future studies.

Concerning subjective norms, as suggested by social identity theory (Tajfel and Turner 2004), different socially relevant players (e.g., suppliers vs. competitors) can influence top managers' norms and, thus, their behaviors in different ways. In addition, consistent with the theory of planned behavior, subjective norms are primarily considered to be derived from social pressures. However, according to value–belief–norm theory (Stern et al. 1999), a decision maker's subjective norm tends to be derived from both socially acquired and personally derived norms (Nigbur et al. 2010). A personal norm is defined according to self-expectations based on internalized values. This concept encompasses a decision maker's commitment to internalized values that are experienced as a personal obligation to engage in a certain behavior (Schwartz and Howard 1984). Further, a personal norm is influenced by social norms, that is, the former is considered qualitatively different from the latter. As observed, "the expectations, sanctions, and obligations that are tied to personal norms are anchored in the self, whereas those tied to social norms are anchored in a social group" (Harland et al. 1999, p. 2508). In addition, the external pressures and, more generally, other stimuli (e.g., the attributes of an innovation) that shape decision makers' norms are expected to be elaborated, selected, and transformed by decision makers' personal norms. Thus, the influence of such pressures and stimuli on behaviors is likely to also be affected by a decision maker's specific personal norms (Steadman et al. 2002). For example, by responding to a personal norm, a decision maker might adopt only innovations that are of high quality to be the most impactful. Such a norm might reduce the possibility of adopting innovations, even if these could offer net benefits and if relevant others have suggested the manager adopt them. Personal norms matter and deserve attention from future studies to refine the contribution of the theory of planned behavior to organizational innovativeness research and to better understand the attributes of innovation–adoption decision associations in organizations.

In studies aimed at exploring managers' decisions on the adoption of innovations, it is also important to consider, along the tradition of marketing studies (Hauser et al. 2006), industry competitiveness as well as industry innovativeness and environmental specificity. For instance, in highly competitive industries, very complex technologies can be a source of competitive advantage and managers might be more likely to adopt them. In addition, the attributes of an innovation can play different roles depending on whether the competitive advantage is based on either differentiation or cost leadership. Equally important to consider is the role of policy makers in promoting the diffusion of innovations (Caiazza 2016). Future research is called upon to continue the integration of micro- and macro-level variables, thus offering theoretical grounds on how contextual factors such as industry competitiveness and innovativeness, as well as the nature of competitive strategy and the role of public policies, shape the attributes of innovation–mediator–adoption decision chains in an organization.

This study focused on the adoption decision and, thus, its results relate to studies on post-adoption, particularly those reviews that have examined the performance outcomes of innovation adoption in organizations (Rosenbusch et al. 2011). Although the results from the two analyses cannot be combined, since the samples are different, both reviews address an important research need—understanding the antecedent innovation performance chain—and suggest a call for primary and review studies aimed at developing an integrated model that accounts for the relationships between the innovation attributes, adoption decisions, and performance implications of innovations in organizations.

7 Conclusions

Research on the adoption of innovations in organizations is abundant and has introduced many different factors likely to influence adoption decisions yet, somehow, without an integrated and comprehensive view and with sometimes contradictory empirical results. Together with calls in past reviews for works aimed at integrating empirical findings across studies on innovation (Anderson et al. 2014), this study is built on an informed literature review on organizational innovativeness and employed a mediation–moderation meta-analytical model to understand the conditions associated with adoption decisions in organizations. This study referred to innovation diffusion theory and the theory of planned behavior and borrowed concepts developed around organizations' resources, thus formulating a conceptual framework and meta-analytically testing its predictions. The results have attempted to contribute to the adoption of innovation literature by shedding light on the theoretical conditions and empirical factors that are likely to shape innovation adoption in organizations. Empirical evidence that the preferences of managers, organizations' resources, and the innovation life cycle matter for adoption decisions was also provided. Additionally, the findings have implications for practice, since they shed light on the drivers that practitioners can focus on to foster or hamper the diffusion of new technologies in their relevant organizations.

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