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Understanding the Acceptance and Usage of IT Project Management Methodologies: Towards a Conceptual Model supported by Case Studies

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ABSTRACT

Organizations invest considerable resources in the development and implementation of IT project management (IT PM) methodologies to increase productivity and quality as well as to save time, effort, and resources. However, such methodologies are often rejected outright by users. Our research analyzes the determinants of individual usage behavior in order to enable organizations to engineer IT PM methodologies that not only provide strategic benefits but also meet the needs of actual users. The existing literature, especially Triandis' Theory of Interpersonal Behavior as well as initial case study results from a number of organizations are used to construct a conceptual model. This research model includes four dimensions: a) Value, b) workgroup influence, c) self-beliefs, and d) organizational characteristics, which are all considered to positively influence the development of the intention to use a methodology. Additionally, we find that the effect of intentions on actual usage can be weakened by an individual's automatic behavior such as habits.

Keywords

Methodology Engineering, Usage, Project Management Methodology

INTRODUCTION

The most important idea behind using methodologies is the belief that one can arrive at pragmatic, cost-effective, and timely solutions to real-world problems in a systematic and predictable way. Research supports this notion and indicates that the use of IT project management (IT PM) methodologies is related to increases in productivity and quality as well as decreases in time and effort (Harter, Krishnan and Slaughter, 2000). Although such methodologies have existed for decades, and a methodological approach can provide organizations with the much-needed assurance that their projects will be successful, only about 50% of organizations are actually able to motivate their staff to use these methodologies (Avison and Fitzgerald, 2003). Organizations that attempt to engineer or deploy methodologies frequently face tremendous resistance from their users (i.e. individuals that use IT PM methodologies). In some cases, methodologies are modified by individuals to suit their own needs, sometimes rendering the methodology ineffective; in the most extreme cases, resistance leads to an outright rejection of the methodology. As a result, the expenditure of resources, time, and effort in developing and implementing an IT PM methodology makes this one of the most critical areas of IS concern (Hardgrave, Davis and Riemenschneider, 2003).

While past research sought to analyze this problem by concentrating on improving project management techniques or methods based on abstract criteria, summarizing checklists of compliance requirements, or by focusing on cognitive user decision-making in narrow and specific organizational contexts (mostly in the field of software engineering), research has to date not yet provided any concrete answers (Wynekoop and Russo, 1995). What is lacking in the literature is a more general examination of the success factors of IT PM methodology use as well as of actual user satisfaction. This leads us to some fundamental questions regarding the use of methodologies, which this study seeks to answer:

- a) What are the determinants of an individual's decision to use an IT PM methodology?
- b) What can organizations do to ensure that individuals adopt and use IT PM methodologies?

We approach these research questions with case studies in which we accompany large multinational organizations in their endeavors to engineer and deploy various methodologies. As this is research in progress, we first develop a theoretical framework based on the existing literature and our initial case study results. We have identified the social science model of

Triandis' Theory of Interpersonal Behavior (TTIB) to provide a comprehensive theoretical basis for analyzing the aforementioned research questions.

The remainder of the paper is organized as follows: Section 2 defines the term methodology and provides an overview of selected prior research. Section 3 describes our research methodology and provides an overview of the cases we are studying. In Section 4, we derive constructs, develop propositions, and present our conceptual model. Finally, in Sections 5 and 6, we discuss the implications of our study and formulate suggestions for future research.

BACKGROUND

Methodologies, methods, and their constituent elements

A fundamental problem in the IT PM literature is the debate on the use of *IT PM method* as opposed to *IT PM methodology* (Iivari, Hirschheim and Klein, 2000). Based on the existing literature, in our study, we consider an IT PM methodology to have a broader scope than IT PM methods. We define an *IT PM methodology* as a set of goals, guiding principles, and beliefs, a multi-step procedure of what to do and how to do it, and the associated methods and techniques (Avison and Fitzgerald, 2003). At this point, it is imperative to distinguish between the use of IT PM tools, techniques, and methods, and the use of an entire methodology – tools, techniques, and methods can be used in the absence of a formal methodology, and the use of a methodology represents a radical change (Hardgrave et al., 2003).

Reasons why the adoption and success of new IT PM methodologies might be so different and so much more challenging than the adoption of specific methods and tools are rooted partly in the tacit organizational and individual problems that are caused by the introduction of new methodologies. For example, the stress associated with the learning of a new methodology, the fear, and the impact on self-esteem and identity associated with organizational restructuring or re-engineering, as well as the emotional costs of role conflict, ambiguity, and/or workplace transformation might be serious inhibitors of IT PM methodology acceptance and usage (Vickers, 1999).

Prior research on the adoption and use of methodologies

While a methodological approach to solving complex tasks holds certain benefits, a methodology in itself is no silver bullet (Iivari et al., 2000). A number of studies suggest that the use of IT PM methodologies is limited in practice, and that – even when they are used – they are not literally applied, which signals a fundamental flaw in methodology engineering. Other authors go so far as to state that methodologies are useful for beginners, rather than for experienced individuals (Iivari et al., 2000). Some authors examine the characteristics of a methodology that lead to successful project results or study the effects of using a methodology on project success dimensions such as project quality, cost, or time (Dybå and Dingsøy, 2008).

An exploratory study by Gibson and Gibson (Gibson and Gibson, 1999) identified a number of factors that might affect the acceptance of methodologies among software developers. However, this study has no theoretical base, uses unvalidated measures, and does not analyze the relationship between the identified factors and the developers' usage intentions (Yadav, Shaw and Webb, 2001). Johnson et. al. (Johnson, Hardgrave and Doke, 1999) examine the beliefs that underlie attitudes, social norms, and behavioral control constructs, in order to understand IS developers' beliefs that underlie methodology usage intentions. However, they did not empirically test the relationships between the constructs. Iivari and Huisman (Iivari and Huisman, 2007) find that organizational culture orientations, especially hierarchical and rational organizational cultures, affect the use of system development (SD) methodologies.

There is a plethora of research that addresses the use of specific tools, techniques, or methods (Leonard-Barton, 1987) that may form part of a methodology. Some studies regard adoption merely as the *intention to use* and do not study the methodology's *actual use*. On the whole, while there is considerable software engineering research on methodology development, studies that examine the determinants of IT PM methodology use at an *individual level*, considering not only the development but also the management of projects, are scarce (Pfleeger, 1999).

Another problem concerns the fact that the status of existing definitions and research on IS/IT methodologies is very specific almost exclusively in the domain of Information systems development (ISD). In our view, specific research needs to be conducted on IT PM methodologies as they go well beyond mere IS development and are "...concerned with exploring and understanding information technology as a corporate resource that determines both the strategic and operational capabilities of the firm in designing and developing products and services for maximum customer satisfaction, corporate productivity, profitability and competitiveness" (Badawy, 1998).

RESEARCH METHODOLOGY

Research approach

We decided to approach the research questions with case studies by accompanying large organizations (5,000+ employees) from three market sectors in their endeavors to develop and deploy different types of IT PM and related methodologies. These organizations are in the initial stages of analyzing stakeholder requirements. We chose a case study approach because, when studying individual decisional behavior, case study research can offer "...insights into the intentions, the reasoning capabilities, and the information-procedures of the actors involved in a given setting" (Gerring, 2006). The cases were selected based on theoretical sampling because, "...given the limited number of cases which can usually be studied, it makes sense to choose cases which are likely to replicate or extend the emergent theory" (Eisenhardt, 1989). Organizations were selected based on whether the type of IT PM methodology they intended to develop was suitable for the research at hand.

Case overview

Case No.	1: IT Benefits Management (IT BM)	2: IT Project Management (IT PM)	3: IT Program/Portfolio Management (IT PPM)
Description	Development of a methodology to manage such that potential benefits arising from IT projects are realized	Development of a comprehensive PM methodology to ensure the efficient and effective execution of IT projects	Development and implementation of a methodology to facilitate the selection and management of the pool of IT Projects and improve the alignment of business and IT in an enterprise
Data Sources	Interviews, document review, field notes, observation	Interviews, field notes, questionnaires, protocols, observation	Interviews, field notes, document review, observation, protocols
Individuals/ departments involved	Project managers, PMO, Controlling (CC), benefits managers, consultants, internal and external clients	Project managers, Project management office (PMO), CC, IS managers, consultants	Enterprise architects, CIOs, business analysts and functional managers, CC, PMO
Market Sectors	Financial sector	Financial sector	Financial, automotive and public sector

Figure 1: Overview of the cases studied

Data collection and analysis

Multiple data collection methods are applied based on a) archival sources, b) semi-structured and unstructured in-depth interviews (lasting 60-90 minutes each) with individuals involved in the management of the organizations' IS/IT, c) protocols, d) document review, and e) field notes of multiple workshops (lasting five to eight hours each) with representatives of top management, corporate controlling (CC), IT project managers, and project management offices (PMO). Case studies involving such diverse user segments, developers, and supporters provide us with a holistic understanding of the development of beliefs and attitudes and the usage behaviors of individuals. In-depth interviews allow us to better understand the process by which people reach decisions about using a particular methodology. The interactive workshops allowed us to gain a deep understanding of the interplay between different organizational units/departments. Field notes and protocols that were gathered in the workshops and team meetings, in which individuals shared their thoughts and emerging ideas, provide clues about relationships, anecdotes, and informal observations (Eisenhardt, 1989). Interviews and workshop protocols were generally conducted and written by two investigators, face-to-face. In order to strengthen the internal validity and generalizability of our research, a TTIB framework was used to form a priori constructs, to develop the interview guide, and to structure field notes/protocols. In short, this a) investigator, b) theory, and c) method triangulation technique (Denzin, 2006) that we applied in our study provides stronger substantiation of constructs and propositions (Eisenhardt, 1989).

Cases were analyzed according to process theory and based on guidelines suggested by Eisenhardt (Eisenhardt, 1989). Data analysis is undertaken in two phases. First, we carry out a within-case analysis, using a content analysis technique that allows

for the analysis of open-ended data. Studying existing organizational case-related documents and creating detailed write-ups helped us become intimately familiar with the cases and revealed the unique patterns of each case, before we set out to generalize through cross-case analysis. Coupled with within-case analysis, through a cross-case analysis, we then executed a detailed search to identify the similarities and differences between the cases. We selected dimensions and categories based on TTIB so as to structure our findings and help us locate patterns in the data. Data patterns found in this way helped us identify elements that were subsequently considered for inclusion in our model. This two-phase process of analyzing data allowed us to constantly compare theory and data, to construct a theory that closely fits the data. Through constant comparison between data (from multiple sources) and constructs, we sharpened our propositions and built evidence that measure the constructs in each case. We also studied conflicting evidence and literature, which provided us with a deeper insight into the emergent theory as well as clarified the limits to generalizability of the focal research. The underlying theory-building process is most likely to produce a valid theory and be consistent with empirical observations because the process is so strongly connected to evidence. To date, we have conducted 21 interviews and participated in 13 methodology development workshops.

CONCEPTUAL FRAMEWORK AND MODEL DEVELOPMENT

In the following section, we construct our conceptual framework (as depicted in Figure 2), based on TTIB, to examine individual methodology usage behavior. According to the TTIB, an individual's decision to use an IT PM methodology depends on his or her intention, which in turn is influenced by cognitive processes, emotional responses, social norms, and habits. For a more detailed discussion of the model, the reader is referred to Triandis (Triandis, 1980).

Value

The usefulness of an IT PM methodology is reflected in the value that would be generated through its use, originating in the mind of an individual through cognitive mechanisms relating to goal attainment (Venkatesh, Morris, Davis and Davis, 2003). Consequently, the more value the use of a methodology is perceived to generate, the more positive the person's intention to use the particular methodology. Initial interview results derived from interviews with six IT project managers from the IT PM case also support this notion, as the majority of the users mentioned the usefulness of a particular methodology in achieving goals to be a key determinant of their desire to use it. The project managers repeatedly mentioned that previous endeavors to develop an IT PM methodology were unsuccessful because the methodology was not considered useful.

Past research on perceived value has focused primarily on such task-related usefulness (also called *utilitarian value*), which seeks to provide instrumental value to the user – such as increasing task performance, encouraging efficiency, and increasing productivity (van der Heijden, 2004). Although utilitarian value has been found to significantly influence a person's behavioral intentions, motivational theory (Deci, 1975) and consumer behavior research suggest that there is another source of value – *hedonic value* – that is more subjective and personal than utilitarian value (van der Heijden, 2004). Perceived hedonic value may therefore be defined as the extent to which the activity of using a methodology is perceived as being enjoyable in its own right, apart from any performance consequences that may be anticipated (Davis, Bagozzi, and Warshaw, 1992). Even though individuals may not expect that using methodologies in organizational settings could prompt high levels of fun, we argue – similar to Venkatesh (Venkatesh, 2000) – that methodology enjoyment is still expected to be a relevant factor in influencing an individual's perceptions of a methodology as “...enjoyment not only includes the desire for fun but also involves among others feelings of exploration, discovery, challenge, loyalty and curiosity” (Venkatesh, 2000). Interviewees in the IT PM and IT program/portfolio management (PPM) case studies occasionally mentioned experiencing ‘pride’ and ‘superiority’ when using a methodology because they had mastered its use. Some managers in the IT benefits management (BM) case studies hinted at experiencing ‘excitement’ at the thought of being able to experiment with various methods and techniques, or felt a sense of ‘accomplishment’ or ‘self-actualization’ when using a methodology. Such feelings support the existence of hedonic value, which might be generated by the mere thought of using a methodology.

Proposition 1: Higher perceived utilitarian value leads to a stronger intention to use a methodology.

Proposition 2: Higher perceived hedonic value leads to a stronger intention to use a methodology.

Workgroup influence

Extensive research on human behavior shows that the intention to use a methodology is influenced by an individual's perception that people who are important to him or her think he or she should or should not use that methodology (Ajzen, 1991). According to Venkatesh and Davis (Venkatesh and Davis, 2000), the reason why subjective norms directly impact a person's intention to use a methodology is because people may choose to use the methodology – even if they don't have a favorable attitude towards its use or the consequences of its use – if they believe “...one or more referents they think would, and they are sufficiently motivated to comply with the referent's opinion”. In order to fully understand the effect of social

influences on a user’s behavior, Deutsch and Harold (Deutsch and Harold, 1955) suggest two dimensions of workgroup influence – normative influence and informational influence.

Normative influence (NI) refers to an individual’s tendency to conform to group members’ expectations and implies that a person’s intention to use a methodology is influenced either a) by the user’s motivation to conform to the opinions of his or her work environment (e.g., colleagues and/or supervisor) in order to realize a reward or avoid a punishment mediated by them, or b) by the user’s motivation to satisfy his or her notion of self-concept by doing what his or her peers (whom he or she wants to be like) do (Burnkrant and Cousineau, 1975).

On the other hand, *informational influences* (II) refer to the tendency to perceive information gained from others as indicative of reality (Deutsch and Harold, 1955) and implies that a person’s intention to use a methodology is influenced by the information provided by *mediums of knowledge* such as experts or publications on the topic (Burnkrant and Cousineau, 1975). II is indicative of uncertainty on the part of the influenced. In other words, an individual relies on information from others to make informed choices and to reduce uncertainty regarding his or her intention to use a methodology about which he or she has little knowledge. We specifically observed positive II on the part of some workshop participants in the IT PM and IT BM cases, exerted through the opinions of consultants who were methodology engineering experts. Workshop participants reacted positively to solutions and explanations provided by these experts and actively sought their advice by asking questions.

Proposition 3: Normative influence is positively associated with a stronger intention to use a methodology.

Proposition 4: Informational influence is positively associated with a stronger intention to use a methodology.

Value of a ITPM Methodology

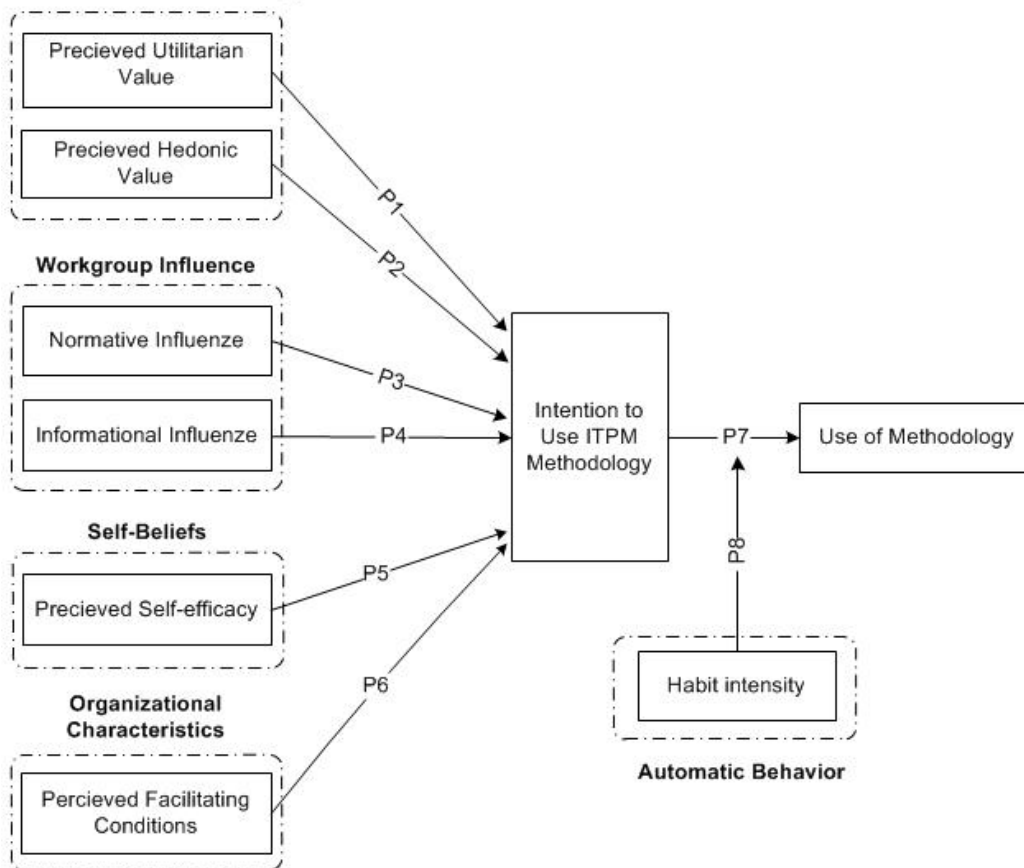


Figure 2: Conceptual model

Self-beliefs

According to Bandura (Bandura, 1986), *self-efficacy* refers to the belief that one has the capability to perform certain actions in order to be able to use an IT PM methodology. Judgment of one's personal competence, reflected in one's self-efficacy, therefore not only determines *if* a person decides to use an IT PM methodology but also how much *effort* he or she will expend to use to it, how long he or she will *persevere* when confronted by obstacles, and how *resilient* he or she will prove to be in the face of adverse situations (Pajares, 1997). Consequently, the more a person feels that he or she possesses the appropriate knowledge, experience, and skills to use a methodology because of his or her confidence in his or her abilities, the more inclined he or she will be to use that methodology.

Proposition 5: Higher perceived self-efficacy regarding an IT PM methodology leads to a stronger intention to use it.

Organizational characteristics

Whereas self-beliefs or self-efficacy are understood as a user's confidence in his or her independent ability to use a methodology (reflecting an internal locus of control), the social psychology literature suggests that there is another dimension to the effective use of a methodology, termed *facilitating conditions* – the user's perceived control over external resources needed to use a methodology (reflecting an external locus of control) (Bhattacharjee, Perols and Sanford, 2008). As such, facilitating conditions can be understood as the degree to which a user believes that organizational resources are available that will help him or her use a methodology. In the context of our research, these desirable organizational resources can be considered as support offered by organizational units (such as the PMO or upper management) in the form of guidance in the correct usage of methodologies and/or political backing.

In all the cases, we observed self-efficacy to be more important for the inexperienced users. In interviews, project managers with less than two years' usage experience with a methodology repeatedly mentioned that they needed better training in the use of complicated methodologies. Support and political backing – represented in the facilitating conditions construct – were also reported in the interviews. One of the managers mentioned that “we don't get help from the PMO when we run into conflicting situations. The only way we resolve the problem is through using our social network and getting help from experienced colleagues. A person who doesn't have a good social network because he is new to the organization finds it extremely hard to use the methodology correctly.” We propose that the influence of facilitating conditions is even stronger in the case of individuals with low self-efficacy because users who are not confident of their abilities will look to organizational support to help them execute IT PM methodology.

Proposition 6: Higher facilitating conditions lead to a stronger intention to use a methodology.

Intention to use and actual use

Research on behavioral decision-making in IS and other fields, based on a number of empirical studies, holds that there is a strong relationship between the intention to use an IT PM methodology and its actual use (Venkatesh et al., 2003; Venkatesh, 2000). *Methodology use* is defined as the frequency, duration, and intensity of a person's interactions with a particular methodology (Venkatesh et al., 2003). Since intention to use is a measure of the strength of a person's intention to actually use it, the literature suggests that a person's intention to use a methodology indicates how hard he or she is willing to try and how much effort he or she is planning to exert to actually use the methodology. In our research, *methodology use* is described in terms of the self-reported (perceived) use of the methodology to facilitate measurement (DeLone and McLean, 2003).

Proposition 7: The stronger an individual's intention to use a methodology, the greater the likelihood that he or she will actually use it.

Automatic behavior

While past research in the field of human usage behavior has focused primarily on understanding an individual's *planned* decision-making in the form of intentions, it is imperative to consider a person's habits, which refer to the non-intentional, automatically inculcated reactions (Ortiz De Guinea and Markus, 2009).

Habit is considered “...a well-learned action sequence, originally intentional, that may be repeated as it was learned without conscious intention when triggered by environmental cues in a stable context” (Ortiz De Guinea et al., 2009). In the context of using a new IT PM methodology, we suggest that individuals in organizations might be reluctant to change their habits that they have learned unconsciously through repetition and might therefore be unwilling to adopt new methodologies.

Because “...perceptions and cognitive evaluations are less likely to be consulted when one performs the same behavior in the same context over and over again” (Danner et al., 2008), this implies that habits are supposed to be formed when a person

repeatedly does things in the *same manner*, in *similar situations*. As such, the more a task is managed out of habit, the less cognitive planning it involves. Consequently, if individuals are habitually managing tasks based on a previous methodology or process, the predictive power of intention to use a new methodology is weakened. We argue, similarly to Ortiz De Guinea et al. (Ortiz De Guinea et al., 2009), that modeling habit as a moderator does not mean denying the existence of the relationship between the intention to use and actual use of a methodology, but merely implies that the strength of this relationship might be weakened depending on the strength of an individual's habit of doing things in a particular way. Some studies have also suggested that the mere intention to use a methodology may therefore be a necessary but *insufficient* condition for use (Leonard-Barton, 1987). Therefore, including the habit construct in our behavioral model adds further explanatory power for methodology usage. Thus:

Proposition 8: The stronger a person's habit of managing tasks in the way he or she has done it in the past, the weaker his or her intention to use a new IT PM methodology.

LIMITATIONS AND OUTLOOK

A well-established finding in the literature on personality and persuasibility is that people with low self-esteem comply with others' suggestions so as to avoid social disapproval. As a very self-confident person might not feel the need to listen to others' opinions, subjective norms might have little effect on his or her intention to use a methodology. Further research is needed to understand the implications of the complexity and dimensionality of social influence, especially as it pertains to IT PM methodology use. Furthermore, as the intensity of a habit is a function of past activities and is developed over time through repeated use, we expect that habit is stronger in the case of experienced users. Additionally, because we conduct case studies in German organizations, our conceptual model might not be generalizable to other cultures – especially the effect of workgroup influence.

We will now develop a survey instrument that will be administered to a diverse population of IT PM users. Subsequently, partial least squares (SmartPLS 2.0.M3) will be used to test the model's fit and to assess the research hypotheses.

CONCLUSIONS

Our work seeks to further the research on individual acceptance and usage of IT PM methodology by unifying the theoretical perspectives on *cognitive* and *automatic* behavioral influences within a single model. Based on a number of highly validated theories – especially TTIB and case study results – we develop a conceptual model that holds that the value of a methodology, workgroup influence, self-beliefs, and organizational characteristics directly affect a person's intention to use the methodology, which would eventually lead to its actual usage. We also propose that individual habits could weaken the causal effect between intention to use and actual usage.

Our research has significant implications for practitioners as well as research. Each of the proposed constructs reveals a different aspect of behavior, and each can serve as a point of departure or attack for organizations in their attempts to steer them in the desired direction (Ajzen, 1991). Our findings could help organizations manage the selection, development, introduction, adoption, and use of new methodologies. We propose that future research should focus on studying the determinants of the constructs identified in this study. A better understanding of these determinants would further enable us to design organizational interventions that would increase the usage of new IT PM methodologies in order to improve productivity and quality and to reduce the expenditure of resources, time, and effort.

In short, our planned research goes beyond prior studies by a) developing a *sound theoretical basis* for analyzing IT PM methodology use, b) unifying the theoretical perspectives on *cognitive and automatic behavior* influences in a single model, c) studying IT PM *methodologies as a whole* (as opposed to parts), d) examining the use of IT PM methodologies in a more *general context* (not only in software development), which leads to a higher generalizability of results, e) investigating adoption of IT PM methodologies at an *individual level*, and f) considering adoption to be the *actual use* of the methodology, rather than the mere intention to do so.

In conclusion, user acceptance of IT PM methodologies remains a complex and elusive yet extremely important phenomenon. Past research has made progress in unraveling some of its mysteries. The development and testing of our model seeks to advance theory and research on this crucial matter.

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