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# INVESTIGATING DETERMINANTS OF PROJECT PORTFOLIO MANAGEMENT ADOPTION

*Etudier les déterminants de l'adoption d'une gestion du portefeuille de projets*

*Research-in-Progress*

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## **Abstract**

*Recently, there has been an emphasis on managing projects strategically within the organization using project portfolio management (PPM). However, the extent of adoption of this innovation and the enabling factors are not well understood in academics and practice. This research-in-progress investigates a model of PPM adoption using data being collected from project managers. The model identifies a total of nine variables capturing various environmental, PPM, and organizational factors that could potentially impact the adoption decision of PPM. The survey is hosted on the Project Management Institute's (PMI) website in order to collect data from PMI members worldwide. The data will be analyzed using logistic regression to identify the factors that have a significant impact on PPM adoption. This research is part of a larger multi-method research of PPM adoption and infusion and the results of this research will help practitioners and researchers better understand factors that impact PPM adoption decisions.*

**Keywords:** Project portfolio management, innovation factors, organizational factors, external factors, adoption

## **Résumé**

*Un intérêt particulier est récemment porté pour gérer de manière stratégique les projets à l'intérieur des organisations en utilisant la gestion de portefeuille de projets (PPM). Néanmoins le degré d'adoption du PPM et ses leviers sont peu connus de la recherche et des praticiens. Cette recherche en cours étudie un modèle d'adoption du PPM. Les résultats de cette recherche aideront les praticiens et les chercheurs à mieux comprendre les facteurs influençant les décisions d'adoption d'un PPM.*

## **Introduction**

With the increasing investment and use of IT in the organization, the effective management of IT projects and resources is becoming critical for gaining competitive advantage (Jeffery and Leliveld 2004). IT managers are constantly challenged to optimize IT investments across business units, to ensure alignment of business needs with appropriate IT assets, and to demonstrate the value of IT to key stakeholders. For most organizations “doing the project right” is no longer sufficient to stay competitive, but instead it is important to “do the right projects” (Elonen and Arto 2003). Recently, there has been an emphasis on managing IT projects strategically within the organization using project portfolio management (PPM) (Elonen and Arto 2003; Reyck et al. 2005). Several organizations have integrated PPM into their business (Datz 2003; Jeffery and Leliveld 2004; Weill and Vitale 1999) and an increasing number of PPM product vendors, consultant books, and services have appeared in the market (Fitzpatrick 2005; Maizlish and Handler 2005; Parviz and Levin 2007). However, the extent of adoption of this innovation and the enabling factors are not well understood in academia and practice (Reyck et al. 2005). The literature also lacks a theoretical framework specific to PPM adoption. This study empirically investigates the factors that impact an organization’s decision to adopt PPM.

The objective of this paper is to investigate the antecedents of PPM adoption and to empirically validate them using a survey of project managers. The conceptual model for our study is based on diffusion of innovations theory, and the technology-organization-environment framework is used to model the antecedents (Tornatzky and Fleischer 1990). This research-in-progress contributes to IS literature and practice by providing new insights on organizational adoption of PPM. Understanding factors that influence the adoption of PPM will be useful in developing better tools to evaluate PPM and in formulating effective strategies to increase the likelihood of adoption of this useful innovation.

The paper is organized as follows. The next section presents a brief review of the related literature, which is followed by the research model and hypotheses. We then discuss the research methodology, including an update on the ongoing data collection effort. The paper concludes with a look at the expected contributions of this study.

## **Literature Review**

The two major areas of research that provide the necessary theoretical foundation for this study are organizational innovation literature and PPM-related literature. A review of key research in these two areas is presented in this section.

### ***Organizational Innovation***

According to the innovation literature (Rogers 1983), the adoption of an innovation occurs when the adopter collects information regarding the innovation and its fit to the organization, and then makes a decision whether or not to invest resources in the innovation (Cooper and Zmud 1990). Research in information systems (IS) has studied the impact of different contextual factors on organizational IT adoption decisions (Chau and Tam 1997; Iacovou et al. 1995). The technology-organization-environment (TOE) framework has been extensively used in IS studies to understand factors leading to IT innovations (Chau and Hui 2001; Tornatzky and Fleischer 1990; Zhu et al. 2006; Zhu et al. 2004). Our study views PPM as a complex *innovation*: an idea, a process, or a program that is new to the adopting unit (Zaltman et al. 1973). The TOE framework allows us to evaluate the importance of various factors impacting the decision to adopt PPM. The framework identifies three aspects of an organization’s context that

influence innovation adoption: 1) technological innovation (in this study, PPM) context 2) organizational context and 3) environmental context (Tornatzky and Fleischer 1990).

The PPM factors relate to the technology characteristics in the TOE model (Tornatzky and Fleischer 1990). The technology factors and their impact on the adoption of the technology have been well researched in the innovation literature (Rogers 1983; Tornatzky and Fleischer 1990; Tornatzky and Klein 1982). A meta analysis of 75 innovation articles by Tornatzky and Klein (1982) identified the following factors that emerged consistently in the literature: compatibility, complexity, and expected benefits. Compatibility of the innovation is described as the fit of the innovation with existing organizational practices and the value and beliefs system (Moore and Benbasat 1991). Compatibility has been found to be positively associated with the adoption and diffusion of innovation (Cooper and Zmud 1990; Ettlie et al. 1984). Complexity of the innovation is defined as the difficulty to use and understand the innovation (Rogers 1983). It has been found to discourage the adoption or the diffusion of the innovation (Tornatzky and Klein 1982). Organizations will adopt innovations if they expect that it will result in more benefits compared to other alternatives or will help them deal with specific problems in operations (Anderson and Narus 1999; Rogers 1983; Tornatzky and Klein 1982). In the context of PPM, data quality and costs are additional innovation factors to consider. The quality of the existing data have been found to greatly impact new system's initiatives (Goodhue et al. 1988). Cost is another variable that has been identified as key for PPM adoption (Chau and Hui 2001). Higher cost of a new innovation could negatively impact the decision to adopt and implement the innovation (Tornatzky and Klein 1982).

The organizational factors in the TOE model relate to the characteristics of an organization. Kwon et al. (1987) found that organizational factors play a crucial role in the adoption decision. Previous studies confirm that organization that have the necessary resources are more likely to adopt new innovations (Fichman 2001). In addition, stakeholder support (e.g. champion, top management, business leaders support) is another important factor when implementing a new innovation (Brooks 1975). Successful diffusion of an innovation requires the organization to change their current processes and the stakeholders within the adopter unit have to learn new ways of doing things. This change might impact their current power status in the organization and could make the stakeholders resist the new innovation (Dent and Goldberg 1999; Markus 1983). The stakeholder resistance could also be a reaction to the perceived or expected threats from adopting the new innovation (Markus 1983).

In the context of IT adoption, researchers have examined the impact of environmental pressure on adoption (e.g. Chau and Hui 2001; Iacovou et al. 1995; Zhu et al. 2006; Zhu et al. 2004). The environmental factors are related to the industry, competitors, and governmental regulations (King and Teo 1994). These factors are external to an organization and they present constraints and opportunities for technological innovations. Past research has shown that intense competition in the industry simulates the spread of an innovation as a response to that external pressure (Mansfield et al. 1977). Our research considers external pressure from competitors, industry, and/or regulatory requirements.

### ***Project Portfolio Management (PPM)***

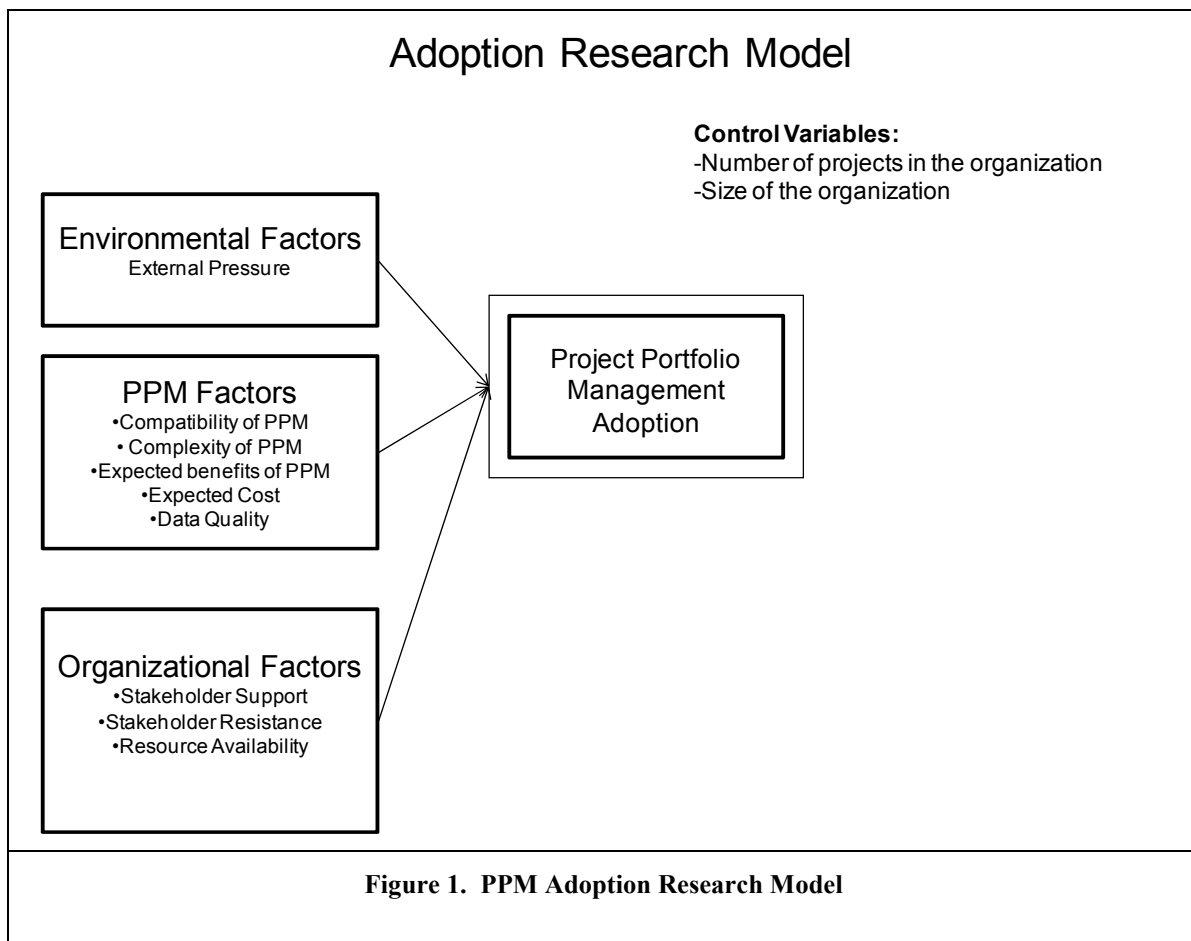
PPM is defined in the literature as a dynamic decision process where a list of new projects are evaluated, selected, and prioritized, while existing projects are accelerated, or terminated and resources are allocated or de-allocated among those projects (Blichfeldt and Eskerod 2008; Cooper et al. 1997; Martinsuo and Lehtonen 2007). Project management focuses on completing a single project successfully, while project portfolio management (PPM) is concerned with managing a collection of projects that supports the organization's strategy (Elonen and Artto 2003; Reyck et al. 2005). Successful deployment of PPM could help the organization achieve several benefits, including: 1) improved visibility of IT projects for better management, 2) improved ability to objectively select optimal projects for funding, 3) improved strategic alignment and 4) greater IT costs reductions (Garr 2006).

There are two main streams of PPM literature. One stream focuses on different project selection and valuation techniques and methods used by organizations (Bardhan et al. 2004; Cooper et al. 1997; Cooper et al. 1999). Examples of these methods are: scoring and ranking models, financial methods, portfolio maps, and alignment methods. The second stream focuses on understanding how PPM is carried out by organizations (Blichfeldt and Eskerod 2008). Jeffery and Leliveld (2004) found that organizations are at different maturity stages when it comes to using the portfolio approach. Other studies have examined how a single project management contributes to IT PPM efficiency, measured as portfolio-strategy alignment, realization of strategy, financial yields, and efficiency of managing the project entity (Martinsuo and Lehtonen 2007). Reyck et al. (2005) found a strong correlation between

IT PPM adoption and reduction in project related problems and between PPM adoption and project performance. Their results were based on a survey of limited sample of 34 European organizations. Current research on PPM has been limited to small sample or focus on the outcomes of PPM adoption. There is a lack of empirical studies on PPM grounded in rigorous theory and based on large sample. This study attempts to fill this gap by investigating the antecedents of PPM adoption and empirically validating them using a survey of project managers.

## PPM Adoption Research Model and Hypotheses

Following the diffusion of innovations literature and the PPM literature discussed above our research model (shown in Figure 1) identifies the factors that impact PPM adoption in the three broad categories: environmental factors, PPM factors, and organizational factors. Environmental factors address the external pressure by organization's competitors, its industry, and the government. The organizational factors are the stakeholders' support, stakeholders' resistance to the new adoption, and the resources available to support the innovation. The PPM factors describe the compatibility of PPM with current organizational structure, complexity of the adopted innovation, its expected benefits, its cost, and the quality of the data available within the organization. A description of the model variables and research hypotheses are presented in the following section.



### *Environmental Factors*

Environmental factors describe the pressure faced by organizations due to the industry, competitors, and government regulations. Past research has found that by adopting a new system, organizations might be able to leverage their

resources to gain a competitive advantage (Porter and Millar 1985). External pressure has been found to influence the spread of an innovation within an organization (Mansfield et al. 1977). Hence, this study explores the impact of external pressure on PPM adoption.

### **External Pressure**

External pressure could force the organization to use IT for strategic purposes (King and Teo 1994). One study found that organizations facing greater environmental uncertainty tend to evaluate and adopt more telecommunications technology (Grover and Goslar 1993). In a competitive environment organizations need to constantly evaluate advances in processes and adopt process innovation to gain competitive advantage and comply with legal and government requirements. In the context of PPM, many authors have identified external pressure as an important factor to adopt and implement PPM (Bonham 2005; Maizlish and Handler 2005). Many organizations adopt PPM out of changing competitive pressure and changing regulatory requirements such as Sarbanes-Oxley and the Clinger-Cohen Act (Bonham, 2005). PPM helps the organization better manage and document their information for audit requirements, which is becoming increasingly important for organizations after the Sarbanes-Oxley Act of 2002. The external pressure from competitors, industry, and governmental regulations is likely to impact the organization's decision to adopt PPM. Thus, it is hypothesized that.

*H1: Organizations that experience greater external pressure are more likely to adopt PPM.*

### **PPM Factors**

Several innovation attributes have been found to have significant relationships with the organizational adoption decision (Kwon and Zmud 1987; Rogers 1983). These attributes are expected benefits, complexity, compatibility, cost, and quality of the data available within the organization. In this study we will explore the impact of these five variables in the context of organizational adoption of PPM.

### **Expected Benefits**

Expected benefits refers to the extent to which the adopted innovation is expected to provide superior outcomes over the current or alternative technologies (Rogers 1983). When the innovation is expected to provide positive benefits, it gives legitimacy to the organization's adoption decision. PPM promises the adopting organization numerous benefits such as improved business-IT communications, improved project outcome, reduced cost, and improved business accountability (Garr 2006; Jeffery and Leliveld 2004; Reyck et al. 2005). These benefits are expected to facilitate the adoption of PPM, Thus we hypothesize:

*H2: Organizations that expect a greater degree of benefits due to PPM are more likely to adopt PPM.*

### **Compatibility**

Compatibility is the extent to which the new innovation is consistent with the needs and existing values and processes of the adopter organization (Ramamurthy and Premkumar 1995; Rogers 1983; Tornatzky and Klein 1982). Typically, new innovations require changes to existing work procedures which might affect the relationships among the organizational units and personnel. PPM adoption could lead to significant changes in the way projects are initiated and managed and might involve changes to the current work procedures and power distribution (Maizlish and Handler 2005). The higher the compatibility of the new innovation with the current organization, the more likely it will be adopted (Cooper and Zmud 1990; Rogers 1983).

*H3: Organizations that perceive PPM to have a higher compatibility with existing values and processes are more likely to adopt PPM*

### **Complexity**

Complexity is the degree to which the new innovation is perceived to be difficult to understand, learn, and use (Rogers 1983). Complexity is expected to hinder the innovation adoption (Ramamurthy and Premkumar 1995; Rogers 1983; Tornatzky and Klein 1982). PPM might require difficult portfolio modeling and financial analysis

measures (Jeffery and Leliveld 2004) that are not currently used by the organization. This perceived difficulty to understand and apply PPM analysis might reduce the likelihood of adopting PPM. Therefore,

*H4: Organizations that perceive PPM to be more complex are less likely to adopt PPM.*

### **Relative Cost**

The relative cost of an innovation to an organization can present a barrier for adoption (Chau and Hui 2001). Prior researchers found that the more expensive the new innovation is, the less likely it is to be adopted (Tornatzky and Klein 1982). Several types of costs are associated with PPM such as the cost to install the tool for collecting and distributing portfolio analysis results, the cost to train users (Jeffery and Leliveld 2004), and the cost to integrate new processes with existing processes and applications. All these cost items could add up to a relatively significant burden for the organization. Therefore, we hypothesize:

*H5: Organizations that perceive PPM to be relatively expensive to implement are less likely to adopt PPM.*

### **Data Quality**

The quality of the existing data could greatly impact new system's initiatives (Goodhue et al. 1988). In the context of PPM, existing project data needs to be collected and made available to the PPM process in order for the portfolio management to be effective (Kendall and Rollins 2003). However, if this data is not available, is not consistent, or is not up-to-date (Goodhue et al. 1988), then the organization might decide that it does not have the data quality needed to adopt the PPM processes. Therefore,

*H6: Organizations that have poor quality of data for PPM are less likely to adopt PPM.*

### **Organizational Factors**

The literature has found that factors related to the characteristics of the organization play a crucial role in the adoption and diffusion decisions of an innovation (Kwon and Zmud 1987; Tornatzky and Fleischer 1990). The adoption model considers three factors: stakeholder support, resource availability, and stakeholder resistance.

#### **Stakeholder support**

Relevant stakeholders are important when implementing a new innovation and they can directly impact its success or failure (Brooks 1975). Management support has been consistently identified as one of the most important factors during IT implementations (Guimares et al. 1992; Nah et al. 2001). Upper management support could help overcome resistance to new innovations (Markus 1983). Users are more likely to accept a new system if they perceive that management is supporting it (Karahanna et al. 1999). The literature has found that the support and commitment of more than the leader is needed to exploit opportunities (Choi and Shepherd 2004). Stakeholders such as business managers, project personnel, and project managers are all major players in the PPM adoption decision (PMI 2006) and therefore their support is essential to the adoption decision.

*H7: Organizations that have a higher degree of stakeholder support for PPM are more likely to adopt PPM.*

#### **Resource availability**

Resource availability includes the availability of different types of resources including funds, time, and trained personnel needed to adopt the new innovation (Ein-Dor and Segev 1978; Zhu and Kraemer 2005). Organizations that have the necessary resources are more likely to innovate (Fichman 2001). Conversely, the lack of such resources could negatively impact the successful adoption of a new system (Beath 1991). Resources are likely to be important for PPM adoption decision given that people need the time, the training, and the funds for process changes resulting from PPM (Jeffery and Leliveld 2004). Hence, we hypothesize:

*H8: Organizations that have greater resource availability for PPM are more likely to adopt PPM.*

## **Stakeholder resistance**

Stakeholder resistance is the extent to which the stakeholders directly impacted by an innovation's adoption are unwilling to participate in the tasks related to the innovation. These stakeholders may take active steps, such as not doing tasks required of them or providing misleading information, to thwart the adoption of the innovation. Multiple stakeholders are impacted by the PPM adoption decision: project team personnel (business and IT), business managers, and project managers. These stakeholders are likely to resist the innovation if they perceive that it will weaken their position within the organization. It is important to note that stakeholders who are not supportive of an innovation's adoption cannot be assumed to automatically resist the innovation. Stakeholder resistance captures the stakeholders' actions that go beyond their lack of support and negatively impacts the innovation. Previous adoption literature has looked at either stakeholder support or stakeholder resistance. Our study is one of the first that captures both dimensions of the stakeholder participation—support and resistance- in the adoption of an innovation. Stakeholder resistance is expected to negatively impact the PPM adoption decision. Therefore,

*H9: Organizations that have greater stakeholder resistance to PPM are less likely to adopt PPM*

## **Control Variables**

Innovation literature suggests two other contextual variables that could impact the adoption decision of an innovation. These variables are the organization size and number of projects within the organization and are treated as control variables in our study.

### **Organization size**

The size of an organization is a surrogate measure of other factors such as operating budget, technology base, and other resources (Rogers 1983). These factors play an important role when adopting and using innovations (Tornatzky and Fleischer 1990). In other words, larger organizations are more likely to adopt the innovation and have sufficient resources to support the innovation (Rogers 1983; Tornatzky and Fleischer 1990). In order to control for the effects of organization size, we use it as a control variable.

### **Number of projects**

The number of projects is an important variable to control because the increase in the number of projects within the organization is likely to increase the complexity of the project management environment and impact PPM adoption and infusion. The relevance of portfolio management is likely to increase when organizations have greater number of projects (Martinsuo and Lehtonen 2007). Thus, to account for the effects of the number of projects, it is included as a control variable.

## **Research Methodology**

### **Data Collection and Pilot Validation**

To test our model hypotheses, we use an empirical approach and collect data using a cross-sectional survey of project managers. The survey was designed based on the literature of portfolio management and diffusion of innovation. When possible, previously tested questions were used and instrument construction guidelines were followed (Fox et al. 1988). The survey was then reviewed closely by three project management experts knowledgeable with survey construction and the topic of PPM and by the local chapter president of Project Management Institute (PMI), a professional group of project managers. The survey was updated based on their feedback in order to establish its face and content validity (Nunnally 1978). The updated survey was then pilot-tested by 43 members of the local PMI chapter to uncover any issues with the wording and content. Pilot respondents provided written comments regarding the survey. Their comments resulted in further minor refinement of the survey. Table 1 shows selected constructs and their respective questionnaire items of the final survey. (We have provided selected constructs because of space considerations. The full questionnaire is available on request.)



The final survey has been created and hosted on Surveyshare.com, a professional online survey hosting company. An introductory message and a web link to the survey questionnaire are now posted on the Project Management Institute (PMI) national website. PMI has over 240,000 project manager professionals in approximately 160 countries. When PMI members access the PMI website survey section, they will see the PPM introduction message encouraging their participation and a web link to the survey instrument. In addition to posting the survey on the PMI website, an email invitation was sent to members of the board of directors of all PMI chapters, using information available from the PMI national and local chapters' websites. A total of 2,000 email invitations were sent. The email invitation informed potential respondents about the survey posted on the PMI website, requested them to fill out the web survey and asked them to consider forwarding the survey to other project managers that are knowledgeable about PPM. In order to encourage participation in the PPM survey, those who complete the survey were offered the chance to enter in a draw for a \$50 Amazon gift card, if they choose to provide their email addresses at the end of the survey. They were also informed that a summary of survey results would be available on the PMI website.

Given that the unit of analysis in this study is the organization that has adopted PPM; a potential problem in collecting data through anonymous survey is that we might have multiple respondents from the same organization. Therefore, it was important to at least know the organization the respondent works for. In order to deal with this issue, two questions were added at the end of the survey asking the organization and the business unit the respondent belongs to. This will allow us to aggregate the results coming from the same organization or the same business unit.

<b>Table 1. Selected Survey Items</b>	
<b>Survey Items</b>	<b>Reference</b>
<p><b>Compatibility:</b> is the fit of the innovation with existing organizational practices and existing beliefs and values</p> <p>PPM is compatible with our organization's processes</p> <p>PPM is compatible with our organization's existing beliefs/values</p>	(Moore and Benbasat 1991)
<p><b>Complexity:</b> is the difficulty of understanding and using PPM</p> <p>Basic project management skills are adequate for PPM</p> <p>PPM requires advanced financial management skills</p> <p>PPM requires advanced knowledge of IT management tools</p>	(Jeffery and Leliveld 2004; Moore and Benbasat 1991)
<p><b>Data Quality:</b> The quality of project data in the organization required to support PPM</p> <p>Project data needed for PPM is accurate</p> <p>Project data needed for PPM is up-to-date</p> <p>Project data needed for PPM is consistent across our organization</p>	(Wybo and Goodhue 1995)
<p><b>Stakeholder Resistance:</b> Key stakeholders resistance to sharing information, loss of power, and process changes resulting from PPM</p> <p>Business personnel resist sharing information required by PPM</p> <p>Business personnel resist the loss of power when PPM is used</p> <p>IT personnel resist sharing information required by PPM</p> <p>IT personnel resist the loss of power when PPM is used</p>	(Jiang et al. 2000; Maizlish and Handler 2005)

Project Managers resist sharing information required by PPM	
Project Managers resist the loss of power when PPM is used	

### Data Analysis

Given the nature of the dependent variables – adopted or not adopted PPM - logistic regression is the appropriate analysis technique for our study. Logistic regression is a form of traditional regression but uses a binary dependent variable and is less strict in terms of normality assumptions. The relative importance of the independent variables in PPM adoption can be inferred from the respective regressions coefficients and their statistical significance. The results of our analysis and the insights from our hypotheses tests will be presented in the conference.

### Conclusion

Though managing IT projects as a portfolio is gaining acceptance among organizations, the enablers and inhibitors of the adoption of this innovation is under-researched and not well understood. The empirical study presented in this paper is part of an ongoing and larger multi-method research to better understand the PPM phenomenon. For PPM practice, our results will be useful in developing guidelines and strategies to increase likelihood of PPM adoption and to overcome resistance. Our contribution to research would be validation of the adoption model in the context of PPM. Further, this study can build the foundations for a more comprehensive research framework to better understand and explain the phenomenon of PPM.

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