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# Correlation Study of Project Management Method and Project Success

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**Abstract:**

This non-experimental correlational study extends previous research examining the relationship between project management methodology and reported project success and the moderating variables of industry and project manager experience. The sample included North American project managers with five years of experience, at least 25 years of age, who had experienced various project management methods. The questionnaire consisted of 58 questions that used a 5-point Likert scale to record responses. The survey consisted of three parts, which included demographic information, questions related to the successful project, and questions related to the less successful (failed/disputed) project. 367 usable responses were received. Examination of constructs included Pearson's correlation coefficient and linear regression to determine the effects of moderating variables. Results indicated that project management methodology has a weak correlation with reported project success, and that this relationship is not moderated by industry or project manager experience. The results were inconsistent with previous studies, suggesting the need for further research into the methods influencing success, including examination of other moderating variables. Keywords: Project management methods, iterative, agile, traditional, waterfall, project success, complex adaptive system.

## 1. Introduction

There is a conflict between anecdotal evidence supporting one methodology over another and the results of studies investigating such claims. Despite the ever-increasing provision of resources to project managers and project managers, project failure rates remain stable (Budzier and Flyvbjerg, 2013; Allen et al., 201 ; Serrador and Pinto, 2015; Aga et al., 2016). Research continues to show that, on average, projects are over budget, over schedule, and that most organizations have at least one project failure in the past year (Schachter, 200 ; Gelbard and Carmeli, 2009; The Standish Group, 2013). Research has also shown that project failure can be so effective that up to 17% of projects can be so bad that they threaten the existence of the company (Bloch et al., 2012). Such failure rates leave researchers and practitioners searching for solutions to ensure continued project success.

This describes the problem of this study. Project success factors—factors that contribute to the successful completion of a project—are important to organizations seeking to create value through intermediate activities. Unfortunately, projects fail despite new resources, methods, procedures and practices. Continued research is needed to determine the relationship between a successful bid and those elements of project management that may be success factors. The research gap addressed in this study is the observed inconsistency in the relationship between project management methodology and project success. Serrador and Pinto (2015) previously conducted a study on the relationship between project management methodology and project success, and this study included several recommendations for further research. The findings of Serrador and Pinto (2015) complemented the work of Budzier and Flyvbjerg (2013). They found

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that agile project management had a positive impact on project schedule (eg project delivery time), but they did not effect on other design constraints.

In contrast, Suet et al. (2016) found that the application of agile project management methods reduced project success. These conflicting results create confusion about the nature of the relationship between project management methodology and reported project success. The purpose of this study was to re-evaluate the results of Serradori and Pinto (2015) by applying recommendations to minimize replication mismatch errors, replicating the accuracy and relevance of the original study, and examining setting (ie industry) as a moderating variable This study investigated a single primary research question, supported by three sub-questions:

Research Question (RQ): To what extent does project management methodology affect the project success of North American project managers, and is this relationship moderated by industry (technology vs. non-technology) or experience?

• Sub-question 1: To what extent do project management methods affect the success of projects in non-technological sectors?

• Sub-question 2: To what extent do project management methods affect project success in the technology industry?

• Sub-question 3: To what extent does years of experience affect project outcomes? After this introduction, Part 2 contains a review of the literature. Section 3 describes the data and method. Section presents the results and observations. Chapter 5 presents the discussion and limitations, as well as recommendations for further research.

## 2. Literature Review

Project Management Methodologies

Project Management Methods (PMM) is a collection of different approaches, tools, models and techniques. A general definition of project management methodology includes the organization and standardization of project management activities to consistently achieve project goals (Zdanyte and Neverauskas, 2011). The main goal of any project management methodology is to increase the probability of project success (Vaskimo, 2011; Spundak, 201 ; Joslin and Muller, 2015). This greater likelihood is fostered by consistency and uniformity, with a specific focus on how to manage the budget, resources, and schedule constraints of any given project (Felix and Harrison, 198 ). Since no two projects are the same, it can be difficult to determine which method to use. There is no single general method of project management that is universally applicable to all projects or all sectors (Charvat, 2003; Cockburn, 200 ). The effectiveness of project management practice can vary depending on the organizational context (Fernandes, Ward, & Araújo, 2015). The situation is further complicated by the fact that the discipline of project management is one of the fastest growing in modern organizations, which means that ideas and concepts are constantly evolving and changing (Gauthier and Ika, 2012).

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ous studies (Fortune et al., 2011; Joslin and Muller, 2015) have shown that limitations in using a project management methodology were ultimately detrimental to project success. These limits can include methods, process, tools, or techniques (Joslin and Muller, 2015). Further, misalignment of a particular methodology and the organizational context can influence performance. For the basis of this study, traditional and agile project management are considered categories inclusive of specific methods. Under the main categories of traditional fall methods such as critical path, critical chain, PRINCE2; agile methods include Kanban, Scrum, Lean.

**Traditional Project Management**

The traditional/waterfall method is perhaps the earliest example of a formal project management methodology. At its core, the traditional approach involves the mechanistic division of work, with an underlying assumption of manageability and predictability (Saynisch, 2010a). The focus on planning helps with the delivery of project success (Laufer et al., 2015).

Winston Royce first introduced the waterfall approach in the 1970s as an example of a flawed development methodology, though it has roots as early as a 1950s presentation by Herbert Benington (Royce, 1970; Benington, 1983). This method is highly structured and is referred to as waterfall as the work of one phase continues downstream into the next stage. Ironically, Royce asserted that appropriate methods should allow forward and backward progress between phases, which contemporary waterfall methods do not include (Royce, 1970).

The initial phases of the project are intended to set the stage for all project work, including establishing project scope and requirements that are necessary to deliver that scope (Thomas and Fernandez, 2008). Execution follows this planning phase, as the work of developing the project goals begins and proceeds. The project ends with a formal closure. Scope control strictly manages changes to scope.

Proponents of this approach argue that the compartmentalization of work efforts contributes to better planning and estimation (Laufer et al., 2015). Also, the linear approach maximizes quality as errors can be detected early in the process and resolved before moving into the next phase (James, 2008). Through clearly defined boundaries, and assuming predictable and linear projects, optimization and efficiency occur by following the plan (Stare, 2014; Spundak, 2014). Finally, as it has been around since the 1950s, it is a familiar approach and easy to use (Laufer et al., 2015).

Critics argue that this tactic is not appropriate when the specifications and requirements cannot be correctly collected at the project onset or are in a state of flux (Saynisch, 2010b). Also, due to the linear nature of the work, changes to requirements can require large amounts of rework or wasted work, which can be detrimental to the project regarding schedule and cost (Haughey, 2009). Another element of criticism is the amount of control required. The traditional approach takes the perspective that a rigorous, hierarchical control best manages complexity (Saynisch, 2010b), but critics assert that project problems stem from this framework (rather than

from a lack of process or planning) (Parker et al., 2015). Finally, this traditional approach carries the perspective as bureaucratic in nature; the project completes large amounts of documentation throughout its lifecycle (Phatak, 2012).

As a point of clarification, there has been confusion and overlap between traditional project management and PMI's Project Management Body of Knowledge (PMBoK). Joslin and Muller (2015) explicitly pointed out that the Project Management Body of Knowledge is not a methodology and is, as the name states, a body of knowledge that serves to collect best practices which are useful across several methods.

**Iterative Project Management**

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The development of agile project management as an iterative methodology came from perceived weaknesses of traditional project management (Spundak, 2014; Heeager and Schlichter, 2016). Leybourne (2009) commented agile project management dismantled traditional project management in favor ofexperimentation. The core concept of agile project management is that better up-front planning cannot be guaranteed, so a different approach needs to emphasize continuous planning (Nichols et al., 2015).

Agile has its roots in the 1990s as project team members began searching for methodologies with flexibility (Kruchten, 2004). The development of agile eventually culminated in the Agile Manifesto in 2001, a set of guidelines for software development (Lindstromand Jeffries, 2004). These principles include valuing individuals and interactions over processes and tools, valuing working software over comprehensive documentation, customer collaboration over negotiation, and responding to change over blindly following a plan (Heeager and Schlichter, 2016).

The basis of agile project management methodology is a series of recurring iterations. Each iteration cycle includes planning, design, coding, and testing (Stettina and Horz, 2014; Stare, 2014). Each iteration consists of co-located teams working closely together to deliver something of demonstrable value to customers (Stettina and Horz, 2014). Agile de-emphasizes up-front planning and extensive documentation (Leybourne, 2009). Dingsøyr et al. (2012) noted that agile seeks to minimize unnecessary, non-value-add work, especially regarding documentation. The cycle of iterations continues until the delivery of a final product which meets customerrequirements.

The advantages of the agile approach are cost savings and speed of delivery (Stettina and Horz, 2014). Further, it is a flexible method that embraces change (Stettina and Horz, 2014). Jackson (2012) asserted that agile is rightfor any project that involves uncertainty, volatility, or risk. Agile project management can also eliminate bureaucratic overhead common to the traditional approach (Stare, 2014). Alaa and Fitzgerald (2013) commented that the major benefit of this method is the ability to address changing scope and requirements.

The disadvantages of the methodology are related to the processes themselves. Proponents tout agile as lightweight due to lack of documentation requirements, but the approach is process intensive. One of the core criticisms of the approach is that adoption requires rigor and robustness in following the prescribed processes (Alaa and Fitzgerald, 2013). For example, a core tenet of agile is the self-organizing team that is 100% devoted to only a single project (Northern et al., 2010). Self- organization is challenging to implement, as managers are more familiar with the command and control style (Augustine and Cuellar, 2006). The dichotomy can hamper speed and efficiency. Indeed, attempting to utilize agile without fully implementing all the components can lead to chaos and stress (Thillaisthanam, 2013), and requires a certain, accepting organizationalculture (Laufer et al., 2015). Also, changing requirements in the agile approach can generate cost overrun and failures due to rework (Conforto and Amaral, 2016).

**Project Success**

Kerzner (2004) noted that the definition of project success has evolved. The initial success criteria consistedof time, cost, and quality (or scope) (Pinto and Slevin, 1988; Kerzner, 2004; Williams et al., 2015; Parker et al., 2015). These have been evolved to represent project management success, however, as they do not factor in whether the project will benefit the organization managing the project (Pinto and Slevin, 1988; Lim and Mohamed, 1999). The lack of agreed-upon definition is a key point in the project management literature, attempting to define project success, to define project management success criteria, or to define critical success factors that lead to or impact project success of failure.

Pinto and Slevin's (1989) discussion of projectsuccess factors is perhaps the seminal paper in the field (Ofori, 2013; Kuen and Zailani, 2012). They present non-experimental correlational

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research that both validates previously stated success factors as well as present additional entries. The purpose of their research is to assert both a causal and predictive link between 14 success factors and project success (Pinto and Slevin, 1989). Additionally, the authors suggest that each ofthese factors has a different importance depending on the project life cycle (Pinto and Slevin, 1989). The authors limited their research to 159 research and development (RandD) projects across a variety of industries (Pinto and Slevin, 1989). Pinto and Slevin (1989) collated the responses from questionnaires distributed to 585 members of the Project Management Institute. Analysis of these responses indicated several implications, including identifying which factors most contributed to project success and at which stage. An example of this analysis, the authors found that during execution, management support was able to predict 54% of project success, where in planning, project mission and schedule accounted for 63% prediction of success. Projectmanagers need to be aware of the project mission, consultand stay connected with "clients," instill a sense of urgency and make sure the right tools, methods, and project team are in place (Pinto and Slevin, 1989). On theword of Pinto and Slevin (1989), use of their Project Implementation Profile (PIP) can assist project managers with project monitoring and evaluation by helping prioritize influences throughout the lifecycle, allowing for"more informed estimates concerning the current status and likely success of their project" (p. 35).

Building upon Pinto and Slevin's (1989) success factors, Cooke-Davies (2002) used empirical research to support earlier assertions as well as redefine success.

Seeking to answer three questions – what factors lead to PM success, what factors lead to project success, andwhat factors contribute to consistently successful projects
– Cooke-Davies (2002) employed a qualitative research design consisting of case studies of 70 global organizations. Cooke-Davies (2002) theorized that there is a causal link between 12 key factors and project success. Europe, Australasia, and North America were the geographic locations of the organizations selected for research and analysis, the organizations had conducted 136 projects between 1994 and 2000, with budgets up to
$300 million and project schedules up to 10 years in duration (Cooke-Davies, 2002). The extensive variety of geographies, budgets, and schedules enhances the external validity of the study. The internal validity is harder to ascertain, as Cooke-Davies (2002) did not explain the methodology for collecting the data. The results of the analysis of these projects show the 12 factors are linked to project success (Cooke-Davies, 2002). These factors include strategic elements, like establishing project portfolio management, tactical elements like risk management, stakeholder management, and change control, and more human elements like establishing relationships between project and functional managers (Cooke-Davies, 2002).

Fortune et al. (2011) also examined projects methods and the link to success, specifically stating their purpose as capturing "real world experiences of people active in project management" (p. 553). The authors theorized thatgeography does not impact project methods used and that the use of project tools influences project success(Fortune et al., 2011). The authors created and delivered a questionnaire to active project managers in three countries (Canada, UK, and Australia) to examine this hypothesis about the geographic impact to project methods. A total of 150 responses, 50 from each country, were used in the data analysis. Selection of the respondents was from professional networks. The analysis of the answers shows similarities in PMM, regardless of country, as well as an increase in usage rates across all techniques compared to previous research (Fortune et al., 2011). Quoting a previous study, the authors conclude that "project managers are becoming more professional regarding use of tools and techniques" (Fortune et al., 2011, p. 571).

Oracle (2010) continued the research trend by conducting a survey of 213 respondents, representative ofboth senior managers and project managers worldwide, as well as interviews with nine executives and subject matter experts in project management, from various fields

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and industries. The findings reflected that meeting schedule and cost requirements were the minimum required for most organizations. Oracle's (2010) study also found that company success was more consistent with agencies that adhered to strong project management methods, including scope and budget administration and control, ongoing risk management, and benefits tracking and realization. Organizations with mature project management practices further connect project objectives to strategic and tactical business objectives. This research further illustrated the dichotomy between resources and continued project failure rates, as 90% of respondents found project management critical (47%) or somewhat important (43%) to the ability to deliver projects successfully. However, a little less than half (49%) follow formal project management methods on only large or complex initiatives

(Oracle, 2010). Further, 80% of respondents felt project management is a core competency that has enabled organizations to remain competitive, but only 27% admit to doing a good job of managing projects (Oracle, 2010).

Allen et al. (2014) suggested that while project success may be the intent of every initiative, failure gets more attention. Indeed, failure, while discouraging, can present a learning opportunity (Mishra et al., 2014). These failures cost billions of dollars in waste each year, clearly suggesting the need for improving the way projects are managed (Nelson, 2005).

The Standish Group's CHAOS reports (InfoQ-Lynch, 2015) have been published since 1994 and provide snapshots of the state of project management success and failure. Even looking at just the last five years' worth of reports show minor changes in success, challenged, and failed rates of projects analyzed by the group (InfoQ- Lynch, 2015). Recent research outside the Standish Group has confirmed these findings, with Rasnacis and Berzisa (2015) commenting that only 2.5% of all organizations globally manage to deliver a project 100% successfully. The authors also asserted that a majority of managed projects are not able to meet initial cost or schedule goals, with some even remaining incomplete (Rasnacis and Berzisa, 2015). Laufer et al. (2015) subjectively qualified that a large percentage of projects are not able to deliver regarding budget, schedule or scope (as measured by delivery of requirements).

The definition used by Serrador and Pinto (2015) consisted of two elements: project efficiency and stakeholder success. The former focused on the traditional constraints of scope, schedule, and budget; the latter on satisfaction of stakeholder expectations.

Inconsistent success and continued failure can be financially costly for organizations (Nelson, 2005; Mishra et al., 2014). The use of project management to deliver unique results, while beneficial, does involve financial investment for organizations (Fisher, 2011). Projects can see efficiencies of scale and repetition, as well as thecreation of increased or additional capacity (Bolman, 2012).

## 3. Research Methods

Project management research exhibits the characteristics of what Hanisch and Wald (2012) called a Mode 2 fieldof knowledge production. Within a Mode 2 field, the research generated deals with solving practical problems. Regarding project management, this has shown to be the case as many of the past research has addressed project success or project failure (Hanisch and Wald, 2012).

As stated by Serrador and Pinto (2015), the evidence in support of agile project management working better than traditional project management in achieving project success is largely anecdotal. This study focused solely on agile and traditional methodologies, including moderatorsindustry and experience, as to the influence of project management methodology on reported project success. The study was limited to agile and traditional as these categories encompass the majority of specific approaches. Project management methodology was the independent variable in this research. Reported project success is the dependent variable in this study. Industry and experience are moderating variables.

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Serrador and Pinto (2015) showed that project management methodology has an influence on reported project success. The present study extends their work by attempting to repeat their findings as well as introducing experience and industry as moderating variables. The participants were recruited through intermediary using a simple, random sample obtained from a double opt-inaccess panel, in attempts to reduce same source bias.

**Population and Sample**

The target population for this study was North American project managers. The research looked at project management methodology, Reported Process Success, industry, and experience. The sampling frame consisted of individuals who chose to opt-in for the online survey. The population met the inclusion criteria of: 25 years of age or older, five years of experience, and experience with multiple PMM. The following criteria eliminated participants from the study: the respondent did not have experience with multiple PMM, the respondent did not agree to the informed consent.

The research utilized an intermediary to deliver the surveys. The intermediary selected participants using a simple, random sample obtained from the sample frame. The use of simple random selection allows researchers to determine the appropriate sample size of participants, which can then be generalized to a larger population (Trochim, 2006). Communication with respondents was conducted by the intermediary, with no direct contact with the researcher. The researcher did provide to the intermediary the Serrador and Pinto (2015) survey as well as the informed consent form for the research, including the objectives of the study along with associated risks.

Using G*Power to calculate recommended sample size, a target of 176 completed surveys was established; 379 responses were received with 367 usable for analysis. Of these 367 completed responses, all participants self- identified as holding a PMP® certification. Additionally, construction was the best-represented industry (16.3%), followed by manufacturing (14.9%), professional services (13.9%) and high technology (13.8%). All respondents were from North America. Average years of experiences was 12.41.

**Instrument**

This research utilized SurveyMonkey, an Internet survey website, to deliver the questionnaire. The instrument utilized for this study was developed by Serrador and Pinto (2015). This research obtained permission from the lead author before reusing the survey instrument. In addition to certain demographic information, respondents were asked to answer questions describing outcomes, as characterized by successful and less-than-successful projects.

The Serrrador and Pinto (2015) instrument consists of 58 questions, utilizing a 5-point Likert scale to record responses. The survey contained three sections, including demographic information, questions related to a successful project, and questions related to a less-than successful (failed / challenged) project. Within each of these latter sections, the questions relate either to project efficiency or stakeholder success.

**Data Collection**

A single electronic survey instrument served as the primary measure for this study. A simple random sampling technique was the mode of data collection. Potential respondents reviewed the informed consent form for the study at the onset of the online survey. Participants were required to accept all terms of the informed consent before proceeding to the survey.

Participants who did not accept the terms of consent were not allowed to continue with the survey and instead were presented with a statement of gratitude and exited the questionnaire. Participants who met the inclusion criteria and who accepted the terms of consent proceeded into the survey. A copy of the consent form was made available to all participants. Data

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collection occurred using SurveyMonkey, as facilitated through an intermediary. Such usage of an Internet survey is a popular data collection method due to speed, efficiency, and cost (Goudy, 2015). However, such surveys also carry risks to validity as to the accuracy and reliability of responses.

### Data Analysis

Analysis of the collected survey responses utilized Statistical Package for the Social Sciences (SPSS). The data was confirmed to have no missing data, which would prevent accurate analysis. Performance and analysis of summary statistics and normality of data were used to establish the quality of the data.

The first and second sets of hypotheses used descriptive statistics as well as Pearson's correlation coefficient to identify and measure differences in reported success between the PMM (Creswell, 2009). The third hypothesis was tested using multiple linear regression. Multiple linear regression is useful in identifying the strength of relationships between multiple predictor variables to a single outcome variable, especially when moderated by another set of variables (Nathans et al., 2012).

### Validity and Reliability

The Serrador and Pinto (2015) instrument utilized 58 questions to measure methodology, including the percentage of planning effort in either the initiation or the initiation and execution phases, as well as reported project success. The instrument has been published and has established validity and reliability as measured by Cronbach's alpha. The Cronbach's alpha for the success factor questions is 0.945; the Cronbach's alpha for stakeholder satisfaction questions is 0.77.

## 4. Results

The results showed only a weak correlation between project management methodology and reported project success. Industry played a moderating role on this correlation, but project manager experience did not. These results indicated that, while project management methodology may play a role in reported project success, there could be different variables of greater importance to project success. Such variables could include the adoption of project management (PM) practices (Golini et al., 2015), maturation of PM practices (Crawford, 2006; Mullaly, 2006), or tailoring of PM practices (Turner and Ledwith, 2016).

Specific results are presented below. Pearson's correlation coefficient test was performed on data based

upon a selection of a hybrid method (based upon % of "agile" deployed, where 0% was fully waterfall and 100% was fully agile), divided into non-technology and technology industries. The results of Pearson's correlation coefficient test on the non-technology group showed a weak positive correlation between project management methodology and reported project success,

**Table 4.** Correlation matrix, waterfall vs. agile, reported project success, within technology

| Technology | Waterfall vs. Agile vs. Not |
|---|---|

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R(316) = 0.294, p < 0.01. This indicates the variable ofproject management methodology positively correlates

| | | | |
|---|---|---|---|
| Technology | Reported_ Success | Pearson Correlation | 0.422** |

with reported project success within non-technology industries. Table 1 shows the statistical analysis of project management methodology and reported project success within non-technology industries.

**Table 1.** Correlation matrix, project management methodology, reported project success, within non-technology

| | | | PM Methodology |
|---|---|---|---|
| Non-Technology | Reported_ Success | Pearson Correlation | 0.294 |
| | | Sig. (2-tailed) | 0.000 |
| | | N | 316 |

The data was then transformed to a binary, waterfall or not, result. Table 2 shows the results of an additional Pearson's correlation coefficient analysis. Using the transformed data showed no statistical correlation, R(316) = 0.102, p > 0.05.

| | | |
|---|---|---|
| | Sig. (2-tailed) | 0.002 |
| | N | 51 |

Testing for the influence of experience on the above correlations was performed with multiple linear regression test, building models to examine correlation and moderation. Model 1 showed significant results, p < 0.05 [F(1,365) = 32.45, p < 0.001]. The adjusted R2 displays that the model predicts 7.9% of the variance in reported project success. Adding experience as amoderator did not significantly affect the results, as shown in Model 2, ΔR2 = 0.001, ΔF(1,364) = 0.375, p = 0.001, b = 0.01, t(364) = 2.83, p = 0.28. These results supported accepting the null hypothesis. The results indicated the variable project management experience does not moderate the correlation of project management methodology with reported project success. Table 5 displays the ANOVA analysis, Table 6 the Model Summary.

**Table 5.** ANOVA[a] analysis

**Table 2.** Correlation matrix, waterfall vs. agile, reported

| Model | | Sum of Squares | *df* | Mean Square | *F* | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 33.954 | 1 | 33.954 | 32.446 | 0.000[b] |
| | Residual | 381.959 | 365 | 1.046 | | |

project success, within non-technology

| | | | PM Methodology |
|---|---|---|---|
| Technology | Reported_Success | Pearson Correlation | 0.102 |
| | | Sig. (2-tailed) | 0.071 |
| | | N | 316 |

0.01. The results indicate the variable of project management methodology positively

The results of Pearson's correlation coefficient test on the technology group showed a moderate positive correlation between project management methodology and reported project success, R(51) = 0.369, p <

| | | | | | | |
|---|---|---|---|---|---|---|
| Total | 415.913 | 366 | | | | |
| Regression | 16.348 | 1 | 16.348 | 14.933 | 0.000[a] | |
| 3 Residual | 399.565 | 365 | 1.095 | | | |
| Total | 415.913 | 366 | | | | |
| Regression | 16.351 | 2 | 8.175 | 7.448 | 0.001 | |

| | | | | | | Non- |
|---|---|---|---|---|---|---|
| | Regression | 34.347 | 2 | 17.173 | 16.383 | 0.000[c] |
| 2 | Residual | 381.566 | 364 | 1.048 | | |
| | Total | 415.913 | 366 | | | |

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correlates with reported project success within technology industries. Table 3 shows the statistical analysis of project management methodology and reported project success within technology industries.

**Table 3.** Correlation matrix, PM methodology, reportedproject success, within technology

| | | | |
|---|---|---|---|
| 4 | Residual | 399.562 | 364 | 1.098 |
| | Total | 415.913 | 366 | |

a. Dependent Variable: Reported Project Success
b. Predictors: (Constant), PM Methodology
c. Predictors: (Constant), PM Methodology, PMExperience
d. Predictors: (Constant), Waterfall vs. Agile
e. Predictors: (Constant), Waterfall vs. Agile, PMExperience

| | | |
|---|---|---|
| Technology | PM Methodology | In addition to running the multiple linear regression |
| | vs. Not | |

with project management methodology, the analysis also

| | | |
|---|---|---|
| Technology | Reported | _Success |
| | Pearson Correlation | 0.369** |
| | Sig. (2-tailed) | 0.008 |
| | N | 51 |

included the transformed variable of waterfall vs.agile. The variable was used to generate Models 3 and 4.

The data was then transformed to a binary, waterfall or not, result. Table 4 shows the results of the Pearson's correlation coefficient test. Using the transformed data showed a moderate statistical correlation, $R(51) = 0.422, p < 0.01$.

Model 3 showed significant results, $p < 0.05$ [$F(1,365) = 14.93$, $p < 0.001$]. The adjusted R2 displayed that this model can predict 3.7% of the variance in reported project success. Adding experience as a moderator did not significantly affect the results, as shown in Model 4, $\Delta R2 = 0.000$, $\Delta F(1,364) = 0.003$, $p = 0.001$, $b = -0.03$, $t(64) = -0.26$, $p = 0.79$.

**Table 6**. Model summarye (reported project success, methodology, experience)

| Model | $R$ | $R^2$ | Adjusted $R^2$ | Std. Error of the Estimate | Change Statistics | | | | | Durbin-Watson |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | $R^2$ Change | $F$ Change | $df1$ | $df2$ | Sig. $F$ Change | |
| 1 | 0.286[a] | 0.082 | 0.079 | 1.023 | 0.082 | 32.446 | 1 | 365 | 0.000 | |
| 2 | 0.287[b] | 0.083 | 0.078 | 1.024 | 0.001 | 0.375 | 1 | 364 | 0.541 | 2.103 |
| 3 | 0.198[c] | 0.039 | 0.037 | 1.046 | 0.039 | 14.933 | 1 | 365 | 0.000 | |
| 4 | 0.198[d] | 0.039 | 0.034 | 1.048 | 0.000 | 0.039 | 1 | 364 | 0.956 | 2.007 |

a. Predictors: (Constant), PM Methodology
b. Predictors: (Constant), PM Methodology, PM Experience
c. Predictors: (Constant), Waterfall vs. Agile
d. Predictors: (Constant), Waterfall vs. Agile, PM Experience
e. Dependent Variable: Reported Project Success

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In summary, the analysis showed a weak correlation between project management methodology and reported project success in non-technology industries, moderate correlation in technology industries, and experience does not moderate these correlation results. That project manager experience did not moderate the PMM correlation with reported project success is a surprising finding. While there is not extensive research, available literature (Easton and Rosenzweig, 2012) provides evidence that experience is associated with improvement. The assumption for project managers is experience helps to improve their ability to work with people, understand organization culture, and learn technical skills through increased experience implicitly carries the assumption of improvement to consistent project success (Darrell, Baccarini, and Love,2010). This bears further investigation.

## 5. Conclusions and Discussion

Surprisingly, the results of this study are not completely consistent with any previous study. The lack of a unified project management methodology (Cockburn, 200 ) creates difficulties, due to which the choice of an inappropriate method can negatively affect the success of the project (Joslin and Muller, 2015). The fact that this study showed only a weak correlation between PMM and project success is not an easy solution to this problem. This study, including the difference from previous studies, may be important for practitioners and researchers. Consistent project success seems to be a wicked problem. Projects are often constrained by volatility, uncertainty, complexity and ambiguity (VUCA). Their success was determined by conflicting information from a network of relevant stakeholders. As usual with wicked problems, no two projects are the same, and a solution (often a project management method) used in one environment rarely succeeds unilaterally. The resulting event is what we are seeing now - consistent project success is simply out of reach. Both this study and the study by Serradori and Pinto (2015) focused on traditional and flexible project management methods measured throughout the project with an iterative design. One suggestion for future research is to target additional methods such as PRINCE2, lean or extreme/Emertxe to examine the strength of the relationship between method and success. Another suggestion for future research is to examine the adaptation of a project management methodology to a specific organization to see if it correlates with project success. Finally another schedule, and scope were also recorded, which may have differed from reported project success and revealed new insights. One of the limitations of this study was the use of an existing online survey. The use of an online survey does not allow for further explanation or deeper examination of the responses. An attempt is made to fully define the questions, and a Likert-like scale is used, which minimizes this limitation, but cannot eliminate the limitation. Another limitation was the failure to record certain demographic information, such as the age or gender of the respondent. According to the participation criteria, the respondent had to be at least 25 years old, but age was not considered in the survey. In addition, the gender of the respondent could be captured to allow for further data analysis. Finally, respondents, including non-PMP certified project managers, lacked demographic representation. The importance of flexibility cannot be underestimated. There are many methods based on clarity of goals and processes, but most of these methods are chosen at the beginning of the project and are not changed during the project implementation. For example, moving from six sigma to critical chain represents a transition that is difficult to manage. Static decision making works without ambiguity and complexity, but is inappropriate in today's VUCA (volatile, uncertain, complex, ambiguous) environment. Additional research on consistent project success is warranted. The use of qualitative methods, such as grounded theory methods, can allow for a deeper examination of the choice, implementation and application of research methodology. Such inductive research emphasizes systematic theory generation through intensive interviews and thematic analysis of possible emerging patterns (Walsh et al., 2015). Future research could also investigate the relationship between methodology and adoption (Golini et al., 2015), maturity (Crawford, 2006; Mullaly, 2006) or adaptation (Turner and Ledwith, 2016).

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