THE RELATIONSHIP BETWEEN PROJECT MANAGER'S GENDER, YEARS OF EXPERIENCE, AND AGE AND PROJECT SUCCESS

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ABSTRACT

Information technology (IT) leaders lose billions of dollars and experience implementation delays because of failed projects. IT leaders must assign the right IT project manager to prevent project failure. Grounded in the critical success factor theory, the purpose of this quantitative correlational study was to examine the relationship between project managers' gender (PMG), project managers' years of experience (PMY), project managers' age (PMA), and project success (PS) in the IT industry. Data were collected from 105 project managers in the U.S. IT sector using an online survey distribution platform. The results of the multiple regression analysis were not statistically significant. A key recommendation for IT business leaders is to assign a project manager based on competency and leadership regardless of PMG, PMY, and PMA. IT business leaders can expect similar project outcomes from project managers with any age, years of experience, or gender.

INTRODUCTION

The increase in information technology (IT) project failure is becoming a major concern to many organizations (Alami, 2016). IT project failure is between 50% and 70%, and 45% of IT projects run over budget and 7% over time (Pimchangthong & Boonjing, 2017). IT organizations experience a rate of over 40% of project failure, and approximately 66% of IT project managers face challenges managing the budget and scope (Project Management Institute [PMI], 2016). There is a serious consideration in many organizations to better understand how to increase the rate of project success (PS). A primary reason IT projects fail is project managers assigned to a project were incompetent (Hughes et al., 2016). The globalization and increasing demand for project managers in the IT industry require organizations to hire competent project managers with the right fit (Ramazani & Jergeas, 2015). Increased research on project management success rates that continue to fall has shown confusion among many individuals and project management communities in the IT sector. Success on projects remains elusive and not well defined (Joslin & Muller, 2016). However, studies have shown that many projects fail due to many factors such as project managers not being able to meet project objectives, cost, time, quality, and performance (Sunindijo, 2015). Increased failure rates on IT projects indicate that organizations struggle to understand what type of project manager they need to assign since project managers play a critical role in PS (Wu et al., 2019). Assigning a competent project manager to a project is challenging and requires considerable effort (Flöthmann et al., 2018). The general business problem is that some business leaders in the IT sector fail to assign the right project manager to the right project to foster PS. The specific business problem is that business leaders in the IT sector do not know whether they can select the right project manager based on the project manager's personal characteristics such as gender, years of experience, and age because little is known about the relationship between project manager's gender (PMG), project manager's years of experience (PMY), and project manager's age (PMA), and PS.

The purpose of this study was to examine the relationship between PMG, PMY, PMA, and PS in the IT industry. The predictor variables were project PMG, PMY, and PMA. The criterion variable was PS. The target population consisted of project managers located in the United States from the IT industry. More efficient IT projects may increase the ability to provide quality, safe, and cost-effective benefits to organizations. Selecting a suitable project manager may enable organizations to deliver communication, technology, and data infrastructure for the community during a sudden urge or need.

Research Question and Hypotheses

The central research question that leads this study was:
What is the relationship, if any, between PMG, PMY, PMA, and PS in the IT industry?

To answer the research question the null and alternative hypotheses were:

H_0: There is no relationship between PMG, PMY, PMA, and PS in the IT industry.

H_1: There is a relationship between PMG, PMY, PMA, and PS in the IT industry.

LITERATURE REVIEW

Theoretical Background

Many leaders in organizations used critical success factors (CSFs) to facilitate useful and timely decision-making (Baporikar, 2013). Project managers use CSFs as a determinant and planning tool for evaluating the direction of the project and predicting the chances of attaining success on projects (Baporikar, 2013). Project managers play a significant role in developing the CSFs of a project since these factors also influence the strategies necessary to spearhead the project to success (Zilberstein & Messer, 2010). Newly appointed project managers seek to understand how to achieve PS by investing in CSFs to meet the demands set for them and ensure the attainment of project objectives (Zilberstein & Messer, 2010). Managers work toward achieving success on projects, and by meeting project objectives to lead others toward success (Millhollan & Kaarst-Brown, 2016). Managers contribute toward the success of various endeavors by addressing project uncertainty and complexity by clarifying the past, present, and future project complexity (Bakhshi et al., 2016).

In addition to organizations, researchers have used CSF theory to examine PS. CSF theory was used by Tran et al. (2020) to review organizational theories and CSFs. The scholars developed the CSFs through the theoretical lenses of five organizational theories being stakeholder theory, resource-based view theory, relational-view theory, innovation diffusion theory, and contingency theory. The findings showed that CSFs were stakeholders' focus, intra-firm management, inter-firm collaboration, new technology acceptance, and strategic fit (Tran et al., 2020). Ayat et al. (2020) also used CSF theory to investigate PS in the IT industry. The scholar's methods of frequency and content analysis were used to identify, categorize, and arrange CSF of IT projects based on their importance, interrelation, and cultural regions. In the years 2015 to 2020, there was an increase in research related to PS in IT projects (Ayat et al., 2020). Ayat et al. identified 25 CSFs to increase the success rate of IT projects of which user participation, stakeholder relationship, project manager emotional

intelligence, communication skills, and leadership skills, and top management support in the project were the most important factors for information communication technology projects. Gunduz and Almuajebh (2020) identified 40 CSFs and distributed a survey to understand how CSF can predict PS. Gunduz and Almuajebh used the research to support, evaluate, and measure the success of projects for better allocation of resources across the construction industry. Numerous CSF variables can be used by leaders in organizations to determine the rate of PS, but CSF with the view of PMG, PMY, and PMA was selected as these variables represented the predictor variables in this study. CSFs theory was the best framework to use in this study to assess PMG, PMY, PMA because these variables were not known to predict PS.

Project Managers' Gender

Gender characteristics and how these characteristics interact in achieving PS and the project outcome results between men and women is an ongoing discussion (Hyde et al., 2019). Researchers have suggested that males and females think, act, and learn differently and are biologically diverse (Hyde et al., 2019). Studies with varying methodologies have shown that women could achieve the same results as men despite the behavioral and psychological variables (Witteman et al., 2019). But due to selection criteria and processes across many organizations, women are less likely to be hired than men in the workplace (Wang & Calvano, 2015). Male project managers have often appeared to achieve PS, but male dominance has been the case for many years in project management despite the similar performance of both genders (Brescoll, 2016; Perryman et al., 2016; Pinto et al., 2017; Rodríguez et al., 2017; Stamarski & Son Hing, 2015). Other research suggested that females who became pregnant were most likely to take maternity leave and leave the project (Hekman et al., 2017). Most females are not taking roles of project managers, painting the disparities existing within the social structures on female stereotypes across many industries (Klopotan et al., 2016).

Regardless of each gender's strength and its ability to ensure success, diversity can increase organizational success and enhance performance (Cook & Glass, 2015). Other researchers such as Godwyn and Stoddard (2017) argued that diversity increases conflict, reduces cooperation, and harms performance; females continue to be a minority in project management with their voices unheard. However, perceptions of injustice have partially mediated the relationship between observed incivility toward women and job satisfaction, turnover intentions, and organizational trust, with men feeling strongly about the uncivil treatment of women at work and the indirect effects on well-being (Miner & Cortina, 2016).

A significant disparity between genders exists in leadership positions (Battaglia et al., 2020). Salaries in the aggregate earned by female professionals are lower than those of their male counterparts, which results in female dissatisfaction on projects due to the wage difference (Schaller, 2016). Thus, there have been fewer projects managed by females, and the demand for equal treatment of females increased (Dreher & Ash, 1990). The labor force on projects has also shown a gap between genders since females were working more as secretaries and

administrators, whereas males dominated management roles and projects with increased paid jobs (Squires et al., 2015). The U.S. Department of Education increased the demand for females to obtain higher education to increase female workers (Grundy, 2017), which allowed women to enter the workforce and take project management roles (Nelson, 2015). However, this created numerous problems to evaluate the number of successes both genders have achieved (Nelson, 2015). But females are still less likely than males to be elected to leadership positions (Alan et al., 2020).

Project Managers' Experience

The extent of a project manager's experience is instrumental in influencing PS (Meredith et al., 2017). Project managers' experience influences their skills, performance, ability to achieve results, and overall PS (Paton & Hodgson, 2016). Most experienced project managers in the IT industry are high achievers because project managers with many years of experience are capable of decisively directing and delegating activities to the project team (Kerzner, 2017), and they spend less time focusing on activities (Ramazani & Jergeas, 2015). Project managers with little or no experience gain success over time in management positions by participating jointly in projects, which allows them to share negative and positive outcomes of the project (Ramazani & Jergeas, 2015). Thus, project managers with good experience need to assist younger managers in improving their quality of performance to excel within the organization (Santos, 2016).

Project managers use different subsets of their skills to influence outcomes in projects (Gomes et al., 2012). For example, time management comes from experience, and when project managers have a high level of expertise in time management, they can plan, schedule, and resolve issues that arise on projects (Brière et al., 2015; Maslach & Leiter, 2016; Svejvig & Andersen, 2015). A project manager with good time management can also effectively communicate with team members (Maslach & Leiter, 2016). PMY also leads to PS because the more experience project managers have, the better they are capable of meeting deadlines because they are better at forecasting, estimating the deliverables, and meeting project budgets (De Carvalho et al., 2015).

The primary focus for leaders in organizations should be focusing on the project manager's experience during the hiring process and before onboarding (Ahmed & Anantatmula, 2017). Many project sponsors in organizations claim that project managers are leaders with potential, but the hiring process across companies preselect project managers based on how well they answer questions and communicate (Sankaran et al., 2019). Although project sponsors in organizations may declare the need to hire suitable project managers, they often experience challenges determining the necessary level of suitability (Dwivedi et al., 2015). To address the experience and skills shortage, some project managers join the profession after obtaining diverse levels of experience on different management levels (Furnell et al., 2017). According to Tóth (2020), PMY is related to project managers' competencies. The less PMY, the more project managers prioritize technical skills, while those with higher PMY consider human aspects more important. The findings also showed that technical skills continue to be

ranked highest by project managers with fewer years of experience. There is an increased need to understand how PMY, talent, and skills impact PS.

Project Managers' Age

PMA is an independent variable in this research. PMA does affect PS (Rezvani et al., 2016). In many countries, the population is aging, which means project managers are aging across the IT industry (Keehan et al., 2017). Aged project managers have increased representation in the entire community of project managers, and this trend of increase will continue to grow (Irmen, 2017). This trend exists in both undeveloped countries and developing ones (Hoxha & McMahan, 2019). According to Hoxha and McMahan (2019), the United Nations (UN) has listed population aging as one of the leading demographic trends of the 21st century and added that an unprecedented 900 million citizens are aged over 60, which constitute 13% of the global population. In the absence of any official information on PMA, the statistic figure available on the PMI webpage indicates a total of 5.5 million active project managers working in IT in the United States (PMI, 2018).

The population aged over 60 is the fastest-growing segment, and by 2050, around 25% of the world population will be over 60 years old (Choi et al., 2017). Kulik et al. (2014) mentioned the need to redefine how we refer to age as an interchangeable attribute because we have an older and more diverse workforce. Many recruiters in organizations fail to express or take note of the project managers' age during the recruitment process (Seboni & Tutesigensi, 2015). Many recruitment organizations fail to take note of PMA and omit to mention age in their policies because of a potential breach of employment statutes and the risk of legal challenges (Seboni & Tutesigensi, 2015). Based on a PMA, the level of organizing, planning, controlling, implementing, and executing projects could vary (Bezak & Nahod, 2011).

Amin and Kamal (2016) researched leadership qualities on project team performance. Amin and Kamal distributed a total of 450 questionnaires, and 379 project managers were selected. The findings showed that PMA positively influences the quality performance as age increases. These findings also showed that the industry has a significant generational gap. The researchers showed that younger project managers were more likely to have an influential background theory and lacked the expertise compared to the old generation of project managers.

Hoxha and McMahan (2019) evaluated the effect of the PMA on PS. The study showed that older project managers, compared to younger ones, focus on project control. Hoxha and McMahan concluded that PMA does not have a critical negative impact on PS. The study also showed that project managers aged over 50 are likely to have taken project management positions after switching from a different career. Some of the research findings showed that young project managers are more likely to choose the project management field as their primary career. Older aged project managers are presumed wiser and high-risk takers compared to the younger generation and tolerate mistakes from younger project managers (Srinivasan, 2012). Younger project managers tend to be more innovative and rely on tools,

software, and shortcuts to complete the job (Hoxha & McMahan, 2019). The absence of support for the younger managers that start their career as a project manager is a significant issue in contemporary society (Paton & Hodgson, 2016). According to Cattell et al. (2016), there is a 30% chance for younger project managers to change careers in the first 10 years. The increased number of active project managers at older ages represents a new challenge for managing a workforce that is more diverse in terms of age (Lain & Loretto, 2016). Due to the lack of benefits, recruitment organizations offer younger project managers an opportunity to change or transfer within departments causing a big gap of specific project experience (Hoxha & McMahan, 2019).

Project Success

Chipulu et al. (2015) researched PS and outlined factors to reduce negative impacts on projects. Many projects fail because of many reasons. Project managers fail to achieve PS because of poor management, incompetency, unclear scope or requirements, and lack of understanding among the team (Dwivedi et al., 2015). Ahmed and bin Mohamad (2016) claimed that few project managers were reporting PS without being transparent whether they delivered the project based on the planned objectives, cost, time, scope, and benefits. The rate of PS to project failure has become a significant concern to many organizations (Alami, 2016). For example, IT project failure in India is between 50% and 70%, and 45% of IT projects run over budget and 7% over time (Pimchangthong & Boonjing, 2017). One of the main reasons why projects fail is hiring project managers who were neither competent nor suitable (Pimchangthong & Boonjing, 2017). Understanding the relationship between PS and project manager's characteristics is a significant step in avoiding failure on projects (Singh & Jankovitz, 2018). Project managers may deem themselves successful, yet other leaders that work on the same project may have a different view and consider the same project a failure (Lauren, 2018).

Researchers at the PMI (2016) conducted a study on factors necessary to deliver projects successfully. The study report was compiled by carrying out a survey that probed project management practitioners and leaders who contributed globally to the value of project management. The study attracted feedback from 3,234 professionals globally from diverse industries. The report showed a positive change in the way organizations manage projects and programs. The report also showed that about 60% of projects were more likely to meet objectives and stay within budget. More projects were meeting the cost budget than in previous years, according to the report. The report displayed that organizations lost an average of $97 million for every $1 billion invested because of the project manager's poor performance and incompetence. The report showed that project managers in the modern world were learning from their past and becoming smarter. The results also showed that project failure had declined on an average of 20% compared to the previous 5 years (PMI, 2016).

Chua and Comendador (2017) conducted a study involving 126 IT project leaders in Massachusetts. The leaders admitted that 55% of projects they worked on did not go right and were considered a failure. The researchers realized that competent project managers addressed project failure by improving various aspects of their trade, such as project management research, embracing innovation, and introducing new technology as solutions. According to Mithas and Rust (2016), project managers are also increasingly investing in the development of management information systems.

Gunter (2020) researched the relationship between project managers' competencies and PS. The findings showed a significant positive predictive relationship between both variables. Levý (2020) researched project managers' leadership and PS. This study's theoretical framework encompassed several theories to understanding the relationship between leadership, project managers, and PS. The findings of this research showed leadership in project managers had a weak relationship with PS.

Menberu (2020) researched PS to determine if project managers' competencies lead to PS. Part of this research was to understand the impacts on PS. The scholar used both primary and secondary data to achieve the intended research objectives. Questionnaires and semi-structured interviews were also used and distributed to 57 participants. The findings showed that project managers' competence predicts PS. Competencies include time management, financial management, cost management, quality management, integration management, scope management, procurement management, risk management, safety management, and environmental management. The scholar findings also showed that the top five CSFs for PS were project cost, project time, technical specifications and functional requirements, clients' satisfaction, and stakeholders' relationship, all related to project managers' competence.

Methodology

In quantitative research methods, researchers use data to test existing theories and specific hypotheses, and in qualitative studies, researchers use the data to generate new hypotheses (Von Bastian et al., 2016). Because the objective of this study was to test hypotheses, the quantitative method was the best method to use. Researchers use nonexperimental correlational design to examine variables and relationships between variables (Becker et al., 2016). Researchers use correlational design when the purpose is to seek and identify if a relationship between variables exists (Miller, 2005). Because the purpose of this study was to determine if an association exists between variables, the correlational design was appropriate.

Web-based surveys emerge as a modern data collection method since researchers can obtain data collection faster with ease and convenience compared to other data collection methods (Couper, 2017). In this study, data were collected through SurveyMonkey Audience. SurveyMonkey Audience is a service through SurveyMonkey that enables researchers to use additional features such as selecting participants based on demographics and selection criteria (SurveyMonkey, 2018a). The research was quantitative, and a reliable and valid instrument for the survey questions was used. The survey results included participants' age, gender, and

years of experience. During data collection, participants accepted the SurveyMonkey Audience invitation and read the informed consent form before agreeing to proceed with the survey.

Participants were automatically targeted based on the following selection criteria: (a) project managers that were 18 years or older at the time of the survey, (b) project managers that have completed projects in the IT industry, and (c) project managers from the United States. Researchers can add prequalifying questions on SurveyMonkey to qualify and disqualify participants based on eligibility criteria (SurveyMonkey, 2018b). Prequalifying questions on SurveyMonkey Audience were used to select participants that met the eligibility criteria before they proceeded to the survey. If participants selected an answer that was not within the eligibility requirement, they were automatically disqualified from taking the survey.

The study included a convenience sampling method to select from a pool of members who were part of the population of IT project managers in the United States and SurveyMonkey members. Very few researchers that previously undertook convenience sampling experienced little credibility (Prabhu & Ramesh, 2019). The procedure served to curb every possibility of sampling bias in the research and was essential to use the chosen sample size for generalizing the entire population of project managers in the IT industry in the US.

Power analysis indicated that a sample size of 56 was sufficient to warrant a confidence level of 0.95 for this study. According to Akobeng (2016), statistical power represents the probability of correctly detecting a real effect or relationship and is the complement of *þ*, which is the likelihood of committing a Type II error. Type II error is the fault of accepting the null supposition when it is false, and when statistical power increases, the probability of making a Type II error decreases (Derrick et al., 2016). A total of 105 responses from the SurveyMonkey webpage were received and processed. A post hoc power analysis showed 99.96% confidence in a sample of 105 IT project managers.

PIP was the instrument used in this study to measure PS. Pinto and Slevin (1988) developed the PIP instrument in 1988 to deal with relationships and measure PS. Project managers use different techniques for measuring PS, including PIP, critical path analysis, flow chart diagram, Gantt chart, and program review techniques (Slevin & Pinto, 1986). Slevin and Pinto (1986) developed the PIP to improve PS using 13 specific PS questions.

Slevin and Pinto (1986) researched topics related to PS and CSFs and broadened their research to assess aspects and factors to help project managers determine if their projects were successful. PIP includes many advantages for assessing PS compared to other instruments and overcomes the weaknesses of different tools used in measuring PS by filling the gaps (Hosford, 2017). PIP was used by many project managers to systematically monitor successful factors concerning their specific projects (Slevin & Pinto, 1986). According to Pinto and Slevin (1988), users can use the PIP instrument to measure PS by determining the survey score. According to Gadison (2016), researchers used the PIP instrument for Likert-type questions on a 7-point ordinal scale to measure success. Previous authors, such as

Hosford (2017) and Gadison (2016), used PIP to measure PS by posing a questionnaire to participants. The rating of each question on the PIP is on a Likert ordinal scale from 1 to 7, where the scale one means participants *strongly agree*, and seven being *strongly disagreed* (Mazur et al., 2014).

PIP included survey questions that are informal, formal, technology, and knowledge assimilation at an interval scale using the seven scales. The length of the survey was short enough that it took the average user less than 5 minutes to complete the survey. Respondents had at least 15 minutes to answer the entire survey. Participants spend 21 seconds on average to answer one survey question (Lohse et al., 2017).

Researchers can calculate the PIP scoring by summing the rating of all the survey questions (Pinto & Slevin, 1988). There were 13 questions on the survey. Respondents rated each question between 1 and 7. The higher the PIP score, the higher the success rate or percentile. The highest score on the survey was rated as 91 or 100th percentile if all questions were rated 7. When the total score of the survey was below 45 or 50th percentile, the project was considered a failure. When the survey score was above 73 or 80th percentile, the project was considered a success. When the score was between 45 and 73, the project was neutral. If the score is less than the 50th percentile, PS is critical (Pinto & Slevin, 1988).

The PIP is an existing instrument used as a project management evaluation tool proven to be trusted and very reliable (Slevin & Pinto, 1986). Researchers use the PIP instrument because of the satisfactory results they can achieve in their research (Hosford, 2017). According to Sava (2016), the PIP instrument was previously used by scholars, which attracted over 100 project managers working in the IT sector and members of PMI. According to Choshin and Ghaffari (2017), a Cronbach alpha over .70 is acceptable. Sava (2016) asserted that PIP has a published reliability score of over .70. Mazur et al. (2014) conducted a study relating to PS, and the PIP instrument had a reliability of .93. The original PIP instrument was used in this research; Dr. Pinto and Dr. Slevin, the authors of this instrument, granted their permission to use the instrument. In this study, Cronbach alpha for PIP was .91, indicating that the instrument was reliable.

Many researchers use multiple regression methods to determine the extent of relationships between variables (Plonsky & Oswald, 2017). Researchers use multiple regression as a statistical method to predict the value or assess a relationship between a dependent variable based on the values of two or more independent variables (Halls & Randall, 2018). Thorugh SPSS, a multiple regression analysis was used to examine if a relationship existed between the predictor variables PMG, PMY, PMA, and the criterion variable PS. Before conducting multiple regression analysis, the type of dependent and independent variables and the assumptions of independence of residuals, linearity, homoscedasticity, multicollinearity, outliners, and normality was considered. According to Plonsky and Ghanbar (2018), the multiple regression assumptions are multicollinearity, normality, linearity, homoscedasticity, and independence of residuals.

Respondents rated each question on the survey between 1 and 7. The higher the rating was, the higher the success rate. Respondents scored the survey a maximum of 91 when all questions were rated 7. Percentile at 50th meant project failure when the score was below 45. Percentile between 50th and 80th meant neutral when the score was between 45 and 73. Percentile above 80th meant the project was a success when the score was above 73. SPSS computer package was used to test and determine if a relationship existed between the predictor and criterion variables. A summary table of the multiple regression showed the coefficient of determination. R2 falls between 0 and 1, where the value 1 means a strong relationship exists between the variables (Zhang, 2017). R2 gives the proportion of variation in the dependent variable that can be explained by the independent variables (Hamilton et al., 2015).

Results

Test of Assumptions

Eight assumptions were assessed: type of dependent variable, type of independent variables, independence of residuals, linearity, homoscedasticity, multicollinearity, outliners, and normality. The dependent variable in this research was PS measured on a continuous scale. The second step included the type of independent variables. The independent variables were PMG, PMY, and PMA. PMG was a nominal categorical variable with two categories: male and female, with no intrinsic ordering. PMG was a dichotomous variable with two categories, male and female. Categorical independent variables in the regression analysis involve applying coding methods in numerical values (Alkharusi, 2012). PMG was numeric, where one represented female and two represented males. PMY and PMA were ordinal variables. PMY and PMA variables both had categories and were ordered by years of experience and age, respectively. Researchers can test ordinal variables with a common statistical framework (Williams, 2020). During analysis, researchers can assign numbers to objects to reflect the empirical relations by always assigning the higher number to the heavier object (Konerding, 2020). The independent variable PMA being ordinal was coded to numeric by assigning a higher number to the highest age. PMY was ordinal and numeric in SPSS by assigning the highest number to the highest years of experience. The results of the analysis showed no relationship exists between the dependent and independent variables.

The third step was to check the independence of residuals. Independence of residuals refers to the assumption that errors are independent of one another (Lewis-Beck & Lewis-Beck, 2015). When the assumption is violated, the independence of residuals will show estimates of the regression coefficient, causing inaccurate results (Chen et al., 2018). The assumption of independence of residuals was checked by plotting and viewing the P-P and scatter plotsand the Durbin-Watson statistic. The Durbin-Watson statistic ranges between 0 and 4, and a value of 2 means that there is no autocorrelation detected in the sample (Rivel & Yirong, 2020). Durbin-Watson statistic was 2.062, indicating no autocorrelation in the sample. The fourth step was to check for linearity. Researchers use scatterplots to visually test the presence of linearity and homoscedasticity (Yu et al., 2020). Data showed that there was no violation of

the linearity assumption. The plot of residual fit the expected pattern well enough to support the claim that the residual was normally distributed, and the points do not lie on a curve around zero, rather than fluctuating randomly, which satisfied the linearity assumption.

The fifth step was to determine if the data showed homoscedasticity. Homoscedasticity or error variance is an assumption used by many researchers and is detected by plotting the residuals data against predicted values (Yang & Mathew, 2018). Data in a scatterplot diagram show that there was no violation of the homoscedasticity assumption. Researchers use scatterplot diagrams to assess homoscedasticity, and a rectangular fashion is enough to assume it exists (Won et al., 2017). Because there was no rectangular fashion shape, the data points were also randomly distributed, showing no curvature with a mean of zero demonstrating the realization of this assumption. The sixth step was to determine if multicollinearity existed. Multicollinearity was evaluated by viewing the correlation coefficients among the predictor variables. Researchers use correlation coefficients analysis to examine the potential relationship between the study predictor variables, and multicollinearity issues are determined by coefficient analysis (Thompson et al., 2017). All correlation coefficients had a VIF score below 10. Values lower than .10 and higher than 10 show high collinearity in the data (Gómez et al., 2016). The VIF values were within the acceptable parameters, showing no multicollinearity.

The seventh analysis was to check the data had no significant outliers and highly influential points. Outliers were evaluated by reviewing Cook's distance. If Cook's distance is less than 1, then researchers do not have to remove outliers in their analysis (Menzel et al., 2017). Cook's range was .143 and the mean was .012, which is higher than three times the average. However, the maximum value (.143) was less than .5, indicating that the variable did not have outliers that had undue influence on the model. The results showed normality was not violated. The eighth step and final assumption was to check if the residuals were normally distributed. A histogram of the regression standardized residuals was plotted to confirm normality was not violated. Normally distributed attributes reveal a perfect belled-shaped curve (Jeong & Jung, 2016). The PS variable had a normal distribution. Therefore, the normality assumption was not violated.

Descriptive Statistics

PS had an average mean of .7752, PMA had an average mean of 2.24, PMG had an average mean of 1.50, and PMY had an average of 1.92. The survey included males and females, though male participants (50.48%) slightly exceeded females (49.52%). Participants' experience varied from 0 to above 20 years. The majority of the respondents had between 0 and 5 years (40 %) of experience, followed closely by participants with between 6 and 10 years of work experience (37.14%). Nevertheless, some participants had between 11 and 20 years of working experience (13.3%), and 9.52% of the respondents revealed having more than 20 years of working experience. The ages of participants varied between 18 and 46. Most respondents were between 25 and 35 years of age (50.48%), whereas 23.81% of

participants were between 36 and 45. The statistics also showed that 17.4% were between 18 and 24, and 8.57% of the research participants were above 46.

Inferential Results

Researchers use multiple regression as a statistical method to predict the value or assess a relationship between a dependent variable based on the values of two or more independent variables (Halls & Randall, 2018). Table 1 and Table 2illustrate the model coefficients from the multiple regression analysis. According to Fauzi (2017), by convention, researchers should reject the null hypothesis (Ho) in favor of the alternative hypothesis (H1) when the *P-value* is below 0.05. A standard multiple linear regression analysis, $\alpha = 0.05$ (two-tailed), was used. For the independent samples t-test, SPSS was used to determine if a relationship existed between the variables.

PMG was a dichotomous variable, so a moderation analysis was conducted. A regression test on males and females was conducted separately to check the significance value to confirm if PMG was a moderator. Researchers can practice the testing of a linear moderation hypothesis by using regression analysis by including each product independently of the other with the dependent variable (Hayes & Montoya, 2017). Based on tables 1 and 2, the p-value for the predictor attributes is not significant because the p values were not less than $\alpha=0.05$ for both males and females.

Table 1

Regression Analysis Summary for Predictors for females

Female	Unstandardized Coefficients		Standardized Coefficients Beta	t	sig
Variable	B	SE B	β		
Constant	0.826	0.055		14.955	0.000
PMA	-0.031	0.024	-0.194	-1.256	0.215
PMY	0.014	0.021	0.106	0.685	0.497

Table 2

Regression Analysis Summary for Predictors for males

Male	Unstandardized Coefficients		Standardized Coefficients Beta	t	sig
Variable	B	SE B	β		
Constant	0.837	0.043		19.423	.000
PMA	-0.010	0.022	-0.080	-0.463	0.645
PMY	-0.024	0.020	-.0203	-1.184	0.242

A multiple regression analysis was conducted instead of an ordinal regression because the dependent variable was not ordinal and was a continuous dependent variable. PMG was a dichotomous variable and not a moderator. Males and females were not statistically significant, as shown in Table 1 and Table 2. A multiple regression with PMG included as

part of the independent variables was conducted, which included females and males. Males were coded as one and females as zero and ran a multiple regression test. Based on table 3, the p-value for the predictor attributes is not significant because the p values were not less than α=0.05. The null hypothesis (Ho) was not rejected, implying that there was no statistical relationship between the dependent and independent variables. PMG, PMY, and PMA in the IT industry do not predict PS. Multiple regression analysis indicated no statistically significant relationship.

Table 3
Regression Analysis Summary for Predictors

	Unstandardized Coefficients		Standardized Coefficients Beta	t	p
Variable	B	SE B	β		
Constant	0.841	0.036		23.198	.000
PMA	-.024	.016	-.165	-1.444	.152
PMY	-.002	.014	-.020	-.174	.862
PMG	-.016	.023	-.066	-.675	.501

Table 4 shows the value of R2 in multiple regression SPSS outputs. Predictors were constant, included PMG, PMY, and PMA. The value of R2 was .035, which indicates that only 3.5 % of the variation in PS being the criterion variable can be explained by the variation in the ipredictor variables PMG, PMY, and PMA.. The value of R2 shows how much the independent variables explain the dependent variable (Owen & Prieur, 2017). R2 gives the proportion of variation in the dependent variable that can be explained by the independent variables (Hamilton et al., 2015).

Table 4
Model Summary (R2 value)

Model	R	R Square	R Square Adjusted R square	Std Error of the estimate
1	0.188	0.035	0.007	0.11941

After analyzing table 3 and table 4, it was concluded that PMG, PMY, and PMA do not predict PS. The results showed no relationship existed between the variables. Thus, the null hypothesis (*H*0) was not rejected, implying that there was no statistical relationship between the predictor and criterion variables. PMG, PMY, and PMA in the IT industry do not predict PS.

Discussion

The theoretical foundation of this study was the CSFs theory. According to Baccarini (1999), success criteria should be project-specific, and a core project management concept. The importance of determining factors to understand PS was carried out by the PMI, and the causes of success and failure on projects have been the theme in many types of research

(Shenhar et al., 2002). According to Parson (2020), project managers' characteristics have been identified as a critical component of CSFs in managing projects and achieving PS.

Hekman et al. (2017) examined the influence of genders and PS on projects and showed that either gender is likely to achieve PS. Hekman et al. showed that PS was different for male and female gender, but they were likely to achieve similar results. This study results aligned with Hekman et al. (2017), in which this research findings showed that PS was not contingent on PMG. The results showed that males and females can achieve similar results and that gender was not a critical factor that impacts PS. Gunter (2020) researched the relationship between project managers' competencies and PS, and the results showed a significant positive predictive relationship between both variables. Even though competencies are gained through experience, there is no evidence that project manager's years of experience predicts competencies. Even if so, one cannot conclude that because years of expereince predicts competencies and because competency predict project success then years of experience predicts project success.

Levý (2020) researched project managers' leadership and PS. Levy's theoretical framework encompassed several theories to understanding the relationship between leadership, project managers, and PS. The findings of this research showed that leadership in project managers had a weak relationship with PS. According to Brière et al. (2015), project managers with higher years of experience could achieve desirable project outcomes compared to project managers with fewer years of experience. The findings of Brière et al. showed that PMY was not a factor that predicts PS in IT projects.

Hoxha and McMahan (2019) evaluated the effect of the PMA on PS, and the study showed that older project managers, compared to younger ones, focus on project control, and concluded that PMA does not have a critical negative impact on PS. The findings of this research confirm the findings of Hoxha and McMahan, showing that the PMA does not predict PS.

Project sponsors should not justify, hire, and target potential project managers based on PMG, PMY, and PMA to predict PS. Projects are critical to the sustainable growth and survival of businesses (Biloslavo et al., 2018). PS is crucial to overall organizational success (Ekrot et al., 2016). Project managers have a significant role in the success of projects (Ekrot et al., 2016; Sadeghi et al., 2014). Project sponsors should focus on project manager's competencies (Gunter, 2020; Menberu, 2020) and leadership (Levý, 2020) as predictors of project success. The problem is that assigning a competent project manager to a project is challenging and requires considerable effort (Flöthmann et al., 2018).

Understanding there is no relationship between PMG, PMY, PMA, and PS in the IT industry may enable project sponsors to select the right project manager to complete community critical IT projects by focusing on other project manager's characteristics that predict PS. Other implications include spreading a sense of equality among project management job seekers as the selection process will not include project manager's characteristics that do not

predict PS; hence, the rejected project managers will understand that they were not rejected because of their PMG, PMY, and PMA values as these variables do not contribute to PS. Employing the right project manager reduces the risks of project failure that can benefit organizations by saving cost on projects and increasing employment for IT project managers.

Conclusion

The purpose of this quantitative correlational study was to examine the relationship between PMG, PMY, PMA, and PS in the IT industry. The predictor variables were project PMG, PMY, and PMA. The criterion variable was PS. The target population consisted of project managers located in the United States from the IT industry. The research question was, what is the relationship, if any, between PMG, PMY, PMA, and PS in the IT industry? The quantitative method was used to determine if a relationship exists between PMG, PMY, PMA, and PS. The statistical tests showed that a relationship does not exist between PMG, PMY, PMA, and PS. Because the findings did not show a relationship between the variables, many organizations can comfortably select the right project manager regardless of PMG, PMY, and PMA. Project sponsors can also have peace of mind that these variables do not predict PS.

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