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Does risk management components influence on project success? Evidence from IT sector

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A B S T R A C T

All organizations and stakeholders would ideally like to see an information technology (IT) project managed successfully. Many researchers have strongly debated the importance of risk management in project management about the size of the project since it gives project managers a forward-looking view of risks and chances to increase the project's success. The main aim of the study is to determine how risk management parameters and their mediated effects impact the effectiveness of IT projects. Data was collected from 261 IT professionals involved in projects through a structured questionnaire and analyzed using regression and SEM to test their statistical significance and prove the hypothesis. The study arrived at some significant results which showed the relationship of Risk Identification and Risk Analysis on Risk Assessment, which impacts Project Success. It also showed that the success of the project depended on Stakeholders Tolerance and Risk Implementation. In addition to this, the study provides evidence that risk management does not influence the success of the project. The study's discovery of the intervening impact of risk management practices clarifies preconceived conceptions in the risk management sector.

1. Introduction

Information technology (IT) projects make for a sizable portion of firm investment, and executives in businesses use project portfolios to establish growth strategies linked to the current and future utilization of resource expenditures (Roya et al., 2019). According to Baptestone and Rabechini (2018), organizational executives want project results to depict a favorable return on investment to strengthen the organization's capacity for future growth. Project success was first intended to be ingrained into projects through the standardization of project management. Yet, conventional project practices and procedures have not demonstrated an increase in project success and target achievement (Pinto, 2013). It has been challenging to pinpoint the variables that influence project success. When project management first became prominent in the 1970s, cost and schedule were heavily weighted in most project decisions (Raz & Michael, 2001). People were more familiar with cost and time than they were with project risk, which led to this favoritism. By the mid-1980s firms acknowledged the need to combine risk with cost, quality, and schedule (Kerzner, 1998). A project risk, as defined by Project Management Institute (2020), is any "uncertain event or situation that, if it occurs, has an effect on at least one project objective". Pritchard (2001) defined project risk as the total effect of the opportunity of unforeseen circumstances that may have a positive or negative influence on the project's objectives. The probability that an unpleasant outcome may cause the project to fail is described as project risk. Despite extensive project management studies, the failure rates of IT projects remain high. The failure rate for IT ventures is too high at 70 percent, according to Engelbrecht et al. (2017). The fundamental problem was that poorly managed risks continue to have a harmful effect on project success. The fact that some project managers were unaware of the link between risk identification,

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risk reduction, and project success was one problem. According to the previous study about project management of information technology, the adoption of risk management has influence on project performance in terms of productivity enhancement, performance improvement and efficiency. Additionally, one of the causes of project failure, along with missed deadlines, increased costs, and subpar performance, is a lack of project risk management. Despite research on the use of risk management in information technology and its impact on project success, a deeper understanding of how risk management affects project success was sought. Risks must be controlled through continuing and iterative decision-making to decrease their influence on the project (Sato, 2014). Hence, the present study tries to address the influence of risk management on project success in the information technology sector.

2. Literature Review

Researchers have always been interested in the study of uncertainty and risk in IT initiatives. Early works include those by Alter and Ginzberg (1978) and Zmud (1980). Later, according to Boehm (1991), risk management mostly entails post-evaluation steps. The purpose of this procedure is to identify the reasons why software projects fail, list the risks, and assign a value to each risk. The next project then makes use of this knowledge to mitigate these risks. By using the understanding of the risks and reasons of project failure gained from previous efforts, the goal is to enhance project predictability in a new project. The basic presumption is that initiatives may be contrasted for risk information to be generalized and applied to new endeavors. It is possible to classify the evaluation technique because it provides a list of hazards that can occur in software projects (Boehm, 1991). On the other hand, in the same paper, Boehm (1991) defines risk management as a procedure that entails discovering, evaluating, regulating, and monitoring occurrences that could impair a software project. After that, risk management entails a set of activities intended to collect information on possible outcomes for a specific project. This series of tasks is carried out throughout the project to help and enhance project management by identifying the appropriate course of action. To improve project performance, all conceivable kinds and forms of risk must be successfully managed. This argument forces firms to create risk management plans since management oversees creating and carrying out these plans for the organization as well as the projects it undertakes. Risk is the probability that the desired outcome will differ from what was anticipated. Evaluating risk for management and monitoring is the main objective of risk management. Risk, as defined by Project Management Institute (2020), is the probability that an uncertain event may cause loss or gain. According to Thomas and Fernández (2008), risk is when a project fails to achieve its stated objectives. These dangers are brought on by several environmental factors. According to Olsson (2008), risk management is vital to the project's success since it prepares the business to handle a variety of risks and dangers. The risk management theoretical framework in projects was developed by Miller and Lessard (2001). The eight elements that make up this process are internal environment risk, goal setting, event recognition, risk assessment, risk reaction, control actions, information and communication, and follow-up.

2.1 Risk Management

Making decisions in the face of ambiguity is the process of risk management. The project manager, who is regarded as a logical actor, manages risks. The phases in risk management are risk identification, risk assessment, and risk response. Several risk management systems have been built around these techniques. Despite being a crucial method for project success, studies have revealed that few project managers use risk management (Silva et al., 2019). It is presumably that risk management will result in project success (Qazi & Dikmen 2019; Baptestone & Rabechini Jr, 2018).

2.2 Risk Identification

The first step in the risk management process, risk identification, is the finding of potential risks. The success of the project is positively impacted by project workers' improved ability to recognize and minimize hazards. The accuracy with which hazards are identified has an impact on project performance. When identifying a risk, mitigation strategies may be suggested. These strategies should be noted for further consideration and deployment in the effective risk planning process. Risk events could happen as the project moves through its life cycle, so risk identification must be ongoing. The project group may be involved in the process to encourage and foster a sense of empowerment and accountability for the risks. The risk identification process is typically tailed by the descriptive risk analysis approach Standards Association of Australia, (2020). Since there is no one “optimal strategy” for identifying hazards, a variety of methods should be used (Hillson, 2002).

2.3 Risk Analysis

Risk analysis is used in risk management processes to determine how closely the degree of risk management is related to a project's success. It might be claimed that applying high-level risk management will raise the likelihood of the project's success given the evident link between successful risk management and project success. A substantial risk that is not recognized and managed will eventually become a significant issue in the project. According to Tinnirello (2020), analyzing how accurately the pertinent project risk information is another step in determining the importance of a risk to a project's success, according to Project Management Institute (2020).

2.4 Risk Planning

Because project workers were better trained to identify and mitigate risks, risk planning had a large and positive impact on project success (Kinyua et al., 2015). Project risk planning has a substantial impact on control of IT projects. At lower levels of uncertainty than they do at higher levels of uncertainty, project risk management techniques have a more significant positive influence on project success (Jun & Qingguo, 2010). Improve project success by finishing it on schedule, under budget, and with a higher profit margin for the vendor firm (Juliane & Alexander, 2013).

2.5 Risk Monitoring

Risk monitoring includes suggestions and recommendations for changes to make to lessen the risks. Corrective measures include, for instance, contingency planning and workaround strategies. To steer the project in line with the project management strategy, preventive activities are recommended. Roque and Carvalho (2013) present the recommended corrective and preventive methods for the configuration management process. As part of risk monitoring, the project's progress in addressing its risk items is reviewed, and corrective action is made as needed.

2.6 Risk Assessment

Determining how the risks that have been recognized will impact the project's success is one of the goals of risk assessment. According to (Ebrahimnejad et al., 2007), "Depending on the available facts, risk assessment can be done technically, subjectively, or semi-quantitatively". The network management system project uses risk assessment as a key tool for identifying current and upcoming issues. Different risk assessment methods consider the program's proper security position but do not consider its future financial state, which affects how issues are measured (Meeampol & Ogunlan 2006). The project's success was greatly influenced by a thorough grasp of the economic environment, the implementation of security management techniques, and the assessment of development risks throughout the project (Han & Huang, 2017).

2.7 Stakeholder Risk Tolerance

The general phrase for risk that stakeholders are ready to accept is stakeholder risk tolerance. As the criterion for project success must be recognized from the perceptions of numerous stakeholders and must equally take into consideration the varied ranges of stakeholder engagement and participation in project results, stakeholders have influenced the success of the project (Newcombe, 2013). The aim of project management is to modify requirements, schedules, and procedures to satisfy the expectations and demands of diverse stakeholder categories. Stakeholders are crucial to the success of a project (Project Management Institute Standards Committee, 2008).

2.8 Risk Control

Controls can be divided into three categories: preventive, detective, and corrective. Preventative measures reduce the impact of threats or prevent them from taking advantage of a project's vulnerabilities. Detective controls reveal when something happened and stop future instances of the same exploitation. Corrective measures call for dealing with a threat's effects first, then putting in place safeguards to prevent such effects in the future (Kliem, 2000). To proactively manage risks and maintain consistency in control during the project execution process, successful businesses make investments in risk management techniques (Guide, 2001). Very risky projects are often assigned to project managers with the most experience, and risk projects are typically more formally planned, overseen, and controlled (Raz et al.,2002). The methodology aims to account for the social, organizational, and political conditions that come with any project while still providing a useful inventory for IT project managers or information controlling the project (Taherdoost, 2018).

2.9 Implementing Risk Response

Since risk response is the process of identifying, studying, choosing, and putting into practice the actions to limit the possibility of risk occurrence in a project, it makes a responsible contribution to risk management. Project success will be ensured by the strategy employed to lower project risk (Miller & Lessard, 2001). Following the identification and evaluation of the project's risks, a suitable response, also known as a risk response strategy, should be created. The project's success depends on this tactic. This risk-reduction strategy should be used by the project management. A project manager should retain their focus on risk management in addition to improving project performance and ensuring the project's overall success.

2.10 Project Success

The outcome of the study is contingent on the success of the project. For the project's success, several factors have been cited. To guarantee that the initiative produced positive social effects, Carvalho and Rabechini (2017) designed a project sustainability model. According to Badewi (2016), project management and risk management advantages can be coupled to account for project success. Project success was attributed by Chih and Zwikael (2015) to organizational performance.

Project management research is still being driven by organizations' reliance on projects to generate value. Successful projects add value to the organization and the economy, and it is these advantages that motivate leaders to employ projects for their own strategic advantage.

3. Objectives

To find the influence of risk management components on project success in IT Business

4. Research Methodology

The most effective strategy for this investigation is the descriptive analytical technique. The analytical approach is focused on gathering trustworthy data on the subject under discussion to assess, degree, and explain the facts and provide a solution to the problem. The goal of the descriptive approach is to present the phenomena in its natural environment. This study adopted a quantitative methodology, gathering questionnaire responses from IT staff members about the risk management procedures used in their company. Regression and ANOVA analysis were performed as part of the research analysis to answer the research problems and evaluate the research framework. The research has followed probability-stratified random sampling with IT employees of the southern region of India. All South Indian information technology firms who have started risk management procedures for their projects make up the study's population. The sample for this study comprises (261) IT project workers. A research tool's dependability depends on its ability to compile meaningful data and quantify variables. The researcher gave the study questionnaire to a group of subject-matter experts who work on IT projects to ascertain the face validity and the relevance of each item to the connected construct. They were able to evaluate the content authenticity as a result. Some of the questionnaire items have been modified, deleted, or rewritten as per the advice of the panel. After considering all the suggestions, a revised version of the questionnaire was made available and delivered to the study sample. In this study, the dependability scores were expressed numerically as a Cronbach's Alpha coefficient. A test's coefficient value of 1.00 indicates that it is completely reliable. For a sufficient degree of reliability to be indicated, the coefficient must be at least 0.60.

5. Analysis and Interpretation

5.1 SEM Analysis

The model was performed in smart-PLS to determine the impact of the study variables and related latent variables on overall quality. PLS-SEM is frequently used in research methods to develop hypotheses. Path analysis, Confirmatory Factor Analysis (CFA), second-order factor analysis, regression strategies, covariance-based structural equation models, and association structure models are some of the applications of SEM. The predicted structural model was assessed using Smart-PLS, which offers advantages over regression-based methods in evaluating several latent components with different manifest factors. PLS includes a two-step process that entails examining both the inner structural model and the outward measurement model, according to Henseler and Schuberth (2023). PLS-SEM is now the most efficient method for multivariate analysis, which is why social science research uses it. The conceptual model's nine constructs—Project success, Risk analysis, Risk Assessment, Risk Identification, Risk Planning, Risk Control, Risk Monitoring, Implementing Risk Response, Shareholder Risk Tolerance, and Project Success—were selected to help with the analysis. The standards specify that the structures must be informative.

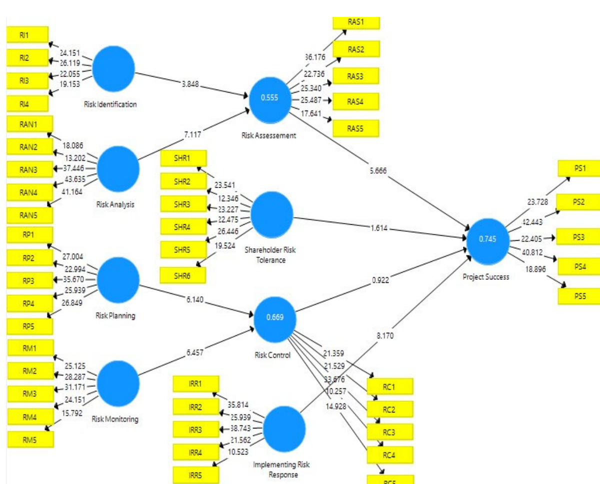

Fig. 1. SEM Model

The SEM model structure shown below includes independent, intervening, and dependent variables. Project success is the independent variable in the study. Risk identification, risk analysis, risk planning, risk monitoring, shareholder risk tolerance, and putting in place the risk response are the independent factors. Risk control and risk assessment are the model's intervening variables.

Table 1
Cronbach's Alpha

Variables	Cronbach's Alpha	Variables	Cronbach's Alpha
Implementing Risk Response	0.86	Risk Identification	0.79
Project Success	0.88	Risk Monitoring	0.85
Risk Analysis	0.86	Risk Planning	0.86
Risk Assessment	0.84	Shareholder Risk Tolerance	0.86
Risk Control	0.8		

After gathering data from 261 respondents regarding risk management in the firm, Smart PLS was used to analyze the data and produce several findings. Because it is used to measure reliability, Cronbach's alpha value is more significant in the results. Cronbach Alpha values above 0.7 are considered good, above 0.8 are better, and above 0.9 are the best, according to the general rule. All the Cronbach alpha values in this study are higher than 0.70, indicating sufficient reliability.

Table 2
Fornell – Larcker criterion Test

Construct	IRR	PS	RA	RA	RC	RI	RM	RP	SRT
Implementing Risk Response	0.802	0	0	0	0	0	0	0	0
Project Success	0.827	0.829	0	0	0	0	0	0	0
Risk Analysis	0.695	0.68	0.81	0	0	0	0	0	0
Risk Assessment	0.701	0.763	0.72	0.789	0	0	0	0	0
Risk Control	0.78	0.749	0.773	0.771	0.749	0	0	0	0
Risk Identification	0.682	0.65	0.743	0.665	0.741	0.788	0	0	0
Risk Monitoring	0.728	0.752	0.756	0.8	0.788	0.77	0.797	0	0
Risk planning	0.707	0.719	0.734	0.758	0.785	0.813	0.845	0.807	0
Shareholder Risk Tolerance	0.769	0.745	0.779	0.738	0.799	0,752	0.786	0.775	0.773

In the above table, the indicator's reliability, the construct's validity, and utility are all verified. According to Renu and David (2020) the loading factor should be more than 0.50 to validate the indicator reliability, and all the outer loading regarding the study are above 0.50 and thus it proved the indicator's reliability. The construct's validity is measured by the Composite Reliability (CR) values of the variables. Cronbach's Alpha is the better replacement for composite reliability. Composite Reliability (CR) is used to measure the variables' validity to the error variance. It lies between the range from 0 to 1. To test its validity, the construct should have a value larger than 0.60. Any value larger than 0.70 or equal to shows that high level of convergent validity (Nunnally & Bernstein,1994).

5.2 Cross Loading

The Cross Loading table shows the various items which have high influence over the constructs. Each value shows how much influence it exerts on other and obtained values are satisfied. The values indicate the multi-collinearity between the factors where the values lie in range from 0.5 to 0.8. In the SEM model according to the thumb rule if the factor value is more than 0.7 then those factors are highly satisfied.

5.3 Reliability Test

The above table has composite reliability that ranges from the values 0.92 to 0.96. Moreover, the results show that the Composite Reliability's values and Cronbach's alpha are having values larger than 0.70 and the average variance (AVE) values of all the variables are more than 0.50, So, the quantification results are largely convergent to measure the effectiveness. The loadings in the study are greater than 0.50, as a result, all the loadings are significant.

Table 3
Reliability Test

Path	Path coefficient	T-statistics	Result
Implementing Risk Response → Project Success	0.000	8.272	Accepted
Risk Analysis → Risk Assessment	0.000	7.849	Accepted
Risk Assessment → Project Success	0.000	5.269	Accepted
Risk Control → Project Success	0.391	0.858	Rejected
Risk Identification → Risk Assessment	0.000	4.193	Accepted
Risk Monitoring → Risk Control	0.000	6.648	Accepted
Risk Planning → Risk Control	0.000	6.326	Accepted
Shareholder Risk Tolerance → Project Success	0.000	2.615	Accepted

The path coefficients of each construct significantly and positively influence project success and each construct. The T – Statistics is greater than 2.57 for each construct and it proves that the constructs have a significant relationship in influencing project success. The rule of the T- statistics value is, it should lie above +2 or should be less than -2. But the path coefficient between Risk control and project success shows a T- value of 0.8 which is not significant, therefore we reject the hypothesis (H7).

Table 4
Output Summary of R-Square

	R Square	R Square Adjusted	Inference
Project Success	0.845	0.841	Supported
Risk Assessment	0.856	0.853	Supported
Risk Control	0.767	0.768	Supported

R square: The squared correlation values of 0.84, 0.85 and 0.76 in PLS path models are deemed considerable, moderate, and weak, respectively. To be deemed a strong mode, each latent endogenous construct's R2 value must be more than 0.6.

6. Results and Discussion

This research study was able to establish seven hypotheses. Using the Smart PLS software to compute the Structural Equation Model (SEM) results were attained that indicated that all hypotheses are supported except hypothesis seven. The table demonstrates a positive and statistically significant path between all seven endogenous latent constructs and mediating factors, indicating that the study's proposed hypotheses were all true. Low correlations are used in PLS path model construction to improve the model's fit. The relevance of this study can be traced to its contextual-centric approach and the attainability of its objectives. This theoretical model would be useful to understand that risk management practices would be a better management technique to implement in IT Industries for project success. This could be viewed as a unique theoretical contribution made by this model.

The Expected Utility Theory, which was put forth by Von Neumann and Morgenstern, is one of the most well-known theories in this area. Developed in 1947, according to Busemeyer (2015), is the EUT theory. According to (Kutsch et al., 2021), the expected utility hypothesis serves as the cornerstone of project risk management. Two of the most crucial decisions that project managers make are risk identification and risk response. The rationality of the decision-maker is a key tenet of EUT. Project managers make decisions to determine risk and how to respond to risk, Sato (2014). Several researchers have applied the EUT theory as the basis for providing empirical results in risk management and studies related to uncertainty. According to Kutsch et al. (2021) identifying risks could get more attention than mitigating problems. Additionally, they argued that EUT does not account for intervening circumstances that alter how risk management is applied. Additionally, they recommended that to respond to and reduce risks to safeguard project performance, risks must be identified and used in other risk management activities. The conclusions of Didraga (2013), who found that risk management aspects influence project performance, are consistent with the findings of this study, which also offers deeper understanding of the intervening processes of risk management not addressed by prior theories.

7. Scope for Further Study

There are some limitations to this study; however, it does explore the potential for further research. As probability-stratified random sampling was used, the data collection was limited and may have disparity due to the smaller sample size. The sample taken into consideration for risk management practices from IT Industries is very small and is restricted to southern regions of India alone, hence the results of this study cannot be generalized. To get more generalized results, we propose that future research broadens the scope of data acquisition by collecting information from other regions as well. It may be possible to determine which risk management practices have a substantial influence on project success by undertaking a more thorough analysis of all the processes regressed against it. Testing project manager characteristics to determine how they affect the usage of risk management may also be helpful. It would be fascinating to conduct more in-depth research on uncertainty in the future. As project managers and executives seek to operationalize the information in the context for executing projects, risk management may evolve into uncertainty management.

8. Conclusion

In conclusion, we can affirmatively say that risk identification and risk analysis with the mediating effect of Risk Assessment is responsible for the Project success. Whereas stakeholders' Risk Tolerance and Risk Implementation directly impact the Project success. Though Risk Planning and Risk Monitoring influence Risk Control, Project success does not seem to be predicted through Risk Control measures. Based on the study's findings, we draw the conclusion that respondents believe risk management procedures are the best project management strategy because they require a substantial amount of team monitoring and learning effort. Most of the participants said that implementing risk management practices had increased the success of the project in their organizations. As a result, there would be a significant increase in project success with fewer chances of error and failures and at the same time, it increases customer satisfaction.

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