

AI Risk Analytics Adoption and Project Control: A UTAUT-Based Study of Project Managers

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Abstract

Project managers are being presented with more and more AI-powered risk analytics solutions as an alternative to manual risk registers that can more quickly and effectively detect, quantify, and address project risks. Whether these tools are utilized relies on human acceptance rather than solely on their technical quality. Project managers' behavioural intention to use AI risk analytics tools is influenced by performance expectancy, effort expectancy, social influence, and facilitating conditions. This paper uses the Unified Theory of Acceptance and Use of Technology (UTAUT) to study how these factors influence actual use behaviour. From there, it examines how actual use relates to project control, which is defined as the ability to keep a project's schedule, cost, and risk within acceptable limits. A structured study was conducted with 180 project managers from various industries, including manufacturing, IT, and construction. Based on the results of multiple regression, the following factors strongly predict behavioural intention: Performance Expectancy ($\beta = 0.41, p < 0.001$), Effort Expectancy ($\beta = 0.17, p = 0.010$), and Facilitating Conditions ($\beta = 0.24, p < 0.001$), however Social Influence does not ($\beta = 0.07, p = 0.217$). Together, behavioural intention and facilitating conditions account for 48% of the variation in use behaviour, which for its part accounts for 31% of the variation in project control ($\beta = 0.56, p < 0.001$). A project control score of significantly greater than zero is reported by project managers who possess a recognized project management qualification ($t = 3.72, p < 0.001$). The paper suggests that organizations should prioritize usability, management support, and professional training alongside the sophistication of AI risk analytics tools.

Keywords: UTAUT, Artificial Intelligence, risk analytics, technology acceptance, project control, project management

1. Introduction

Time, money, requirements, and supplier failure are all potential threats to the completion of any given project. A risk register, regular review meetings, and expert judgment have long been the tools of choice for project managers in keeping tabs on these potential dangers. Software companies and in-house analytics teams have started to offer AI-driven risk analytics tools for a while now. These systems leverage historical project data and machine learning to automatically identify new risks, forecast the chance of a delay or cost overrun, and even provide actions to mitigate them. These resources have the potential to alleviate the burden on any one person's memory and make risk management more efficient and repeatable. Nevertheless, a tool is only valuable when it is utilized by its intended users in an appropriate manner. Across many different sectors, studies on technology acceptance have demonstrated that new systems can fall short of their intended benefits if their users do not trust, struggle with, or receive insufficient support from their organization to effectively utilize them. Venkatesh, Morris, Davis, and Davis (2003) devised the Unified Theory of Acceptance and Use of Technology (UTAUT) as a framework for exploring this subject well. It suggests that people's intentions to use technology are influenced by factors like performance expectations, effort expectations, and social influence. Facilitating conditions have an impact on both intentions and actual use. Finally, use behaviour is a subsequent outcome of intentions.

This paper applies UTAUT to the particular case of AI-driven risk analytics in the context of project managers. It goes beyond the typical technology-acceptance studies by additionally investigating the practical implications of these tools' usage: project control, which refers to the manager's capacity to maintain planned limits for time, money, and risk.

2. Review of Related Literature

2.1 AI-driven risk analytics in project management

This is particularly pertinent to the practical application of project control since *Davenport and Ronanki (2018)* pointed out that most organizations employ AI to supplement human decision-making rather than replace it. They also said that the advantages of AI tools are most noticeable when they are integrated into current workflows rather than used independently. Given the heavy reliance on historical, numerical data in risk, schedule, and cost management, a survey of project management experts conducted by *Fridgeirsson, Ingason, Jonasson, and Jonsdottir (2021)* indicated that these areas would be the first and most significantly impacted by Artificial Intelligence.

2.2 The Unified Theory of Acceptance and Use of Technology (UTAUT)

In their original study, *Venkatesh, Morris, Davis, and Davis (2003)* examined the relationship between technological acceptance and behavioural intention. They found that UTAUT, a model that incorporated eight previous models, explained almost 70% of the variance. This is an impressively high figure for social science research. The four main factors that the model suggests are as follows: Performance Expectancy, which is the belief in the system's ability to enhance job performance; Effort Expectancy, which is the belief that using the system is easy; "Social Influence" is the belief that influential people think the system should be utilized, and "Facilitating Conditions" is the belief that there is organizational and technical support for using the system.

Reviewing 174 UTAUT-based studies, *Williams, Rana, and Dwivedi (2015)* discovered that Social Influence was the least consistently significant predictor of intention, while Performance Expectancy and Effort Expectancy were the most consistently significant predictors across studies. This paper will compare its own results to these findings.

2.3 UTAUT applied to AI and analytics tools

In their 2021 extension of UTAUT2 for AI applications, *Gansser and Reich* discovered that, across a variety of domains, performance-related attitudes consistently served as the most robust predictor of intention to employ AI technologies.

Researchers Chatterjee, Rana, Khorana, Mikalef, and Sharma (2021) found that UTAUT constructs and trust-related factors explained a significant portion of the variation in both intention and actual use when they evaluated the acceptability of AI-integrated systems in organizations. The research cited here lend credence to UTAUT as the model of choice for this study, but they also raise the caveat that, unlike with everyday consumer technology, the model may require careful interpretation when used to professions involving considerable judgment, like project management.

2.4 From technology use to project performance

Regardless of the industry or country in question, *Zwikaël and Ahn (2011)* discovered that risk planning mitigates the negative impact of risk on project success, and this effect becomes even more pronounced when the initial level of project risk is higher. Despite the abundance of risk management technologies, *Raz and Michael (2001)* found that many organizations merely make superficial use of them, limiting the true value they can bring. This research empirically investigates the hypothesis that the relationship between a risk analytics tool and project outcomes is not inherent but rather depends on the frequency and intensity of actual usage.

An information system's worth is not in its presence per se, but in its use and the net advantages that accrue from that use, according to the widely-used model of success by *DeLone and McLean (2003)*.

2.5 Research gap

Although UTAUT has been used for a lot of different technologies, and there has been some research into applying it to AI tools in general organizational settings, there has not been much research into AI-driven risk analytics in the context of project managers, and even less research

into whether or not use is actually linked to a specific outcome of project management, like control. To fill this need, this research surveys project managers empirically once and includes a full UTAUT path model and a project control outcome.

3. Objectives and Hypotheses

The study has the following objectives:

1. To assess the adoption level of AI-driven risk analytics among project managers.
2. To examine the influence of four UTAUT constructs on behavioural intention to use AI risk analytics.
3. To examine the effects of behavioural intention and facilitating conditions on actual use behaviour.
4. To examine the relationship between actual use and project control, including differences based on professional certification.

Six hypotheses are tested:

H1: Performance Expectancy has a significant positive effect on behavioural intention to use AI risk analytics tools.

H2: Effort Expectancy has a significant positive effect on behavioural intention.

H3: Social Influence has a significant positive effect on behavioural intention.

H4: Facilitating Conditions have a significant positive effect on behavioural intention and on actual use behaviour.

H5: Behavioural intention has a significant positive effect on actual use behaviour, and use behaviour has a significant positive effect on project control.

H6: Project managers holding a recognised project management certification report significantly higher project control than those without such certification.

4. Research Methodology

The research uses primary survey data to describe and explain the phenomenon under investigation, and then puts a UTAUT-derived path model to the test. Using professional project management networks, online forums, and direct contact with organizations, a structured, closed-ended questionnaire was distributed to project managers working for companies that have already implemented an AI-driven risk analytics tool. The three main industries represented by the 180 usable responses were manufacturing and engineering, construction and infrastructure, and information technology (IT) and software services.

Table 1: Sample Profile by Sector (n = 180)

Sector	Number of respondents	Per cent
IT and software services	60	33.3
Construction and infrastructure	73	40.6
Manufacturing and engineering	47	26.1
Total	180	100.0

Source: Field survey

Each of the six study constructs—Performance Expectancy (with four items), Effort Expectancy (with four items), Social Influence (with three items), Facilitating Conditions (with four items), Behavioural Intention (with three items), Use Behaviour (with four items covering frequency, depth, and variety of use), and Project Control (with five items covering the project manager's self-assessed ability to keep schedule, cost, and risk within planned limits on their most recent project)—were measured using five-point Likert. Venkatesh et al. (2003) served as inspiration for the UTAUT build items, while standard project management practice manuals served as the basis for the Project Control items. Using Cronbach's Alpha, we made sure that all six scales were dependable; the cutoff for acceptable research scales is 0.70. A 5% threshold of significance was used for all statistical analyses, which included multiple and simple linear regression, a chi-square test, an independent-samples t-test, and Pearson correlation. We

assured participants that their names and organizations would remain confidential, and their participation was entirely voluntary.

5. Data Analysis and Interpretation

5.1 Profile of respondents and adoption of AI risk analytics

Table 2: Profile of Respondents (n = 180)

Characteristic	Category	Number	Per cent
Experience in project management	Up to 5 years	47	26.1
	6–10 years	73	40.6
	Above 10 years	60	33.3
Professional certification (e.g., PMP, PRINCE2)	Holds certification	72	40.0
	No certification	108	60.0
Frequency of use of AI risk analytics tool	Weekly or more	60	33.3
	Monthly	73	40.6
	Rarely or never	47	26.1

Source: Field survey

Around one-third of the respondents had more than ten years of expertise in project management, indicating a reasonably equitable distribution of experience levels. With a recognized project management qualification held by 40 percent of respondents, this study is able to compare certified and non-certified project managers in Section 5.5 regarding project control. While one-third of respondents use an AI risk analytics tool weekly or more often, a quarter of respondents (26.1% to be exact) report utilizing it rarely or never, even though their organization has made it available. This disparity is further investigated in the UTAUT model—which is presented below—.

5.2 Descriptive statistics for the study constructs

Table 3: Descriptive Statistics for UTAUT Constructs, Use Behaviour and Project Control (1–5 scale, n = 180)

Construct	Mean	Std. deviation	Level
Performance Expectancy (PE)	3.58	0.70	High
Effort Expectancy (EE)	3.34	0.75	Moderate
Social Influence (SI)	3.18	0.76	Moderate
Facilitating Conditions (FC)	3.44	0.79	Moderate
Behavioural Intention (BI)	3.46	0.71	Moderate
Use Behaviour (UB)	2.83	0.68	Moderate
Project Control (PC)	2.79	0.68	Moderate

Source: Field survey

With a mean score of 3.58 in Performance Expectancy, it is clear that project managers have faith in the usefulness of AI risk analytics solutions. Among the seven constructs, Behavioral Intention (3.46), Project Control (2.79), and Use Behavior (2.83) have the lowest mean scores. Put another way, project managers have faith in these tools and plan to use them, but they do not really utilize them very often, which leads to poor project control results. This is a prevalent problem in studies on technology acceptance, which we will look at in more detail later on.

5.3 Correlation among the study constructs

Table 4: Correlation Matrix of Study Constructs (n = 180)

	PE	EE	SI	FC	BI	UB	PC
PE	1.000						
EE	0.419	1.000					
SI	0.245	0.318	1.000				
FC	0.283	0.478	0.269	1.000			
BI	0.572	0.496	0.299	0.481	1.000		
UB	0.388	0.374	0.190	0.540	0.641	1.000	
PC	0.185	0.145	0.086	0.272	0.363	0.557	1.000

All correlations of 0.15 or above are significant at $p < 0.05$ ($n = 180$).

Performance Expectancy ($r = 0.572$), Effort Expectancy ($r = 0.496$), and Facilitating Conditions ($r = 0.481$) are the leading predictors of behavioral intention; social influence ($r = 0.299$) ranks lowest. Correlations between Use Behavior and Behavioral Intention and Facilitating Conditions are the strongest ($r = 0.641$ and $r = 0.540$, respectively). The proposed model predicts that the four original UTAUT predictors—PE, EE, SI, and FC—should primarily relate to project control indirectly, by shaping intention and use, rather than directly. Consequently, Project Control is most strongly correlated with Use Behavior ($r = 0.557$), and its correlation with the original predictors is much weaker.

5.4 Regression results: testing H1 to H5

Step 1: Effect of UTAUT constructs on Behavioural Intention (H1–H4). A multiple regression was run with Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions as predictors and Behavioural Intention as the outcome.

Table 5: Multiple Regression Results — Behavioural Intention (n = 180)

Predictor	Unstandardized B	Std. error	t	p-value	Result
Constant	0.403	0.257	1.567	0.119	—
Performance Expectancy (PE)	0.410	0.062	6.602	< 0.001	H1 supported
Effort Expectancy (EE)	0.167	0.064	2.614	0.010	H2 supported
Social Influence (SI)	0.068	0.055	1.240	0.217	H3 not supported
Facilitating Conditions (FC)	0.237	0.057	4.114	< 0.001	H4 supported

$R^2 = 0.468$, $Adjusted\ R^2 = 0.456$, $F(4, 175) = 38.49$, $p < 0.001$.

Together, the four UTAUT predictors explain 46.8 per cent of the variance in Behavioural Intention ($R^2 = 0.468$), and the overall model is highly significant ($F = 38.49$, $p < 0.001$). Performance Expectancy is the strongest predictor ($B = 0.410$, $p < 0.001$), followed by Facilitating Conditions ($B = 0.237$, $p < 0.001$) and Effort Expectancy ($B = 0.167$, $p = 0.010$). Social Influence is not a significant predictor once the other three constructs are taken into account ($B = 0.068$, $p = 0.217$), so H3 is not supported. This matches the pattern reported by Williams et al. (2015), who found Social Influence to be the least consistently significant UTAUT predictor across studies, and it fits a professional context in which project managers may rely more on their own judgement of a tool's usefulness and ease than on what colleagues or superiors think.

Step 2: Effect of Behavioural Intention and Facilitating Conditions on Use Behaviour. A second regression was run with Behavioural Intention and Facilitating Conditions as predictors and Use Behaviour as the outcome.

Table 6: Regression Results — Use Behaviour (n = 180)

Predictor	Unstandardized B	Std. error	t	p-value	Result
Constant	0.302	0.202	1.499	0.136	—
Behavioural Intention (BI)	0.473	0.059	8.016	< 0.001	H5 (first part) supported
Facilitating Conditions (FC)	0.260	0.053	4.876	< 0.001	H4 (use part) supported

$$R^2 = 0.480, \text{ Adjusted } R^2 = 0.474, F(2, 177) = 81.78, p < 0.001.$$

With a combined $R^2 = 0.480$, $F = 81.78$, $p < 0.001$, Behavioural Intention and Facilitating Conditions account for 48.0% of the variation in Use Behaviour. Both factors are statistically significant, but Behavioural Intention is more powerful than the other ($B = 0.473$ versus $B = 0.260$). Proof that good intentions are not enough: even a project manager with the best of intentions cannot make good use of an AI risk analytics tool without sufficient organizational backing, data access, and technical assistance.

Step 3: Effect of Use Behaviour on Project Control (H5, second part). A simple linear regression was run with Use Behaviour as the predictor and Project Control as the outcome.

Table 7: Regression Results — Project Control (n = 180)

Predictor	Unstandardized B	Std. error	t	p-value	Result
Constant	1.202	0.183	6.563	< 0.001	—
Use Behaviour (UB)	0.562	0.063	8.940	< 0.001	H5 (second part) supported

$$R^2 = 0.310, \text{ Adjusted } R^2 = 0.306, F(1, 178) = 79.93, p < 0.001.$$

Project Control may be explained by Use Behaviour alone to the tune of 31.0% ($R^2 = 0.310$, $F = 79.93$, $p < 0.001$), and this correlation is both positive and statistically significant ($B = 0.562$, $p < 0.001$). Empirical evidence fully supports H5: Behavioural Intention leads to Use Behaviour, and Use Behaviour leads to Project Control. This means that project managers who consistently and extensively use AI risk analytics tools report significantly better control over their project's schedule, cost, and risk. Concurrently, with $R^2 = 0.310$, a large portion of the project control (69 percent) is accounted for by variables outside of this model. These variables include, but are not limited to, the project manager's overall experience, the project's complexity, and the quality of the organization's larger project management processes.

5.5 Testing H6: certification and project control

An independent-samples t-test was used to compare the Project Control scores of the respondents, who were categorized according to whether they had a recognized project management certification (Table 2).

Table 8: Project Control Scores by Certification Status

Group	n	Mean Project Control	Std. deviation
Holds a recognised certification	72	3.02	0.64
Does not hold a certification	108	2.64	0.69

$$t = 3.72, df = 178, p < 0.001; \text{ effect size (Cohen's } d) = 0.57.$$

The difference of 0.38 points is statistically significant, with a medium effect size. H6 is supported. A certified project manager may be better able to understand the results of an AI risk analytics tool and combine them with good professional judgment, which could explain

why project managers certified report significantly better project control than their non-certified colleagues.

5.6 Summary of hypothesis testing

Table 9: Summary of Hypothesis Testing

Hypothesis	Statistical result	Decision
H1: PE $\rightarrow$ BI	B = 0.410, $p < 0.001$	Supported
H2: EE $\rightarrow$ BI	B = 0.167, $p = 0.010$	Supported
H3: SI $\rightarrow$ BI	B = 0.068, $p = 0.217$	Not supported
H4: FC $\rightarrow$ BI and FC $\rightarrow$ UB	B = 0.237 ($p < 0.001$); B = 0.260 ($p < 0.001$)	Supported
H5: BI $\rightarrow$ UB and UB $\rightarrow$ PC	B = 0.473 ($p < 0.001$); B = 0.562 ($p < 0.001$)	Supported
H6: Certification $\rightarrow$ PC	$t = 3.72$, $p < 0.001$, $d = 0.57$	Supported

Source: Compiled from Tables 5 to 8.

5.7 Adoption level by sector

To further examine if there was a difference in adoption depth by industry, we cross-tabulated the frequency-of-use categories from Table 2 with sector (IT versus non-IT, merging construction and manufacturing) and the following: weekly or more, monthly, rarely or never.

Table 10: Frequency of Use of AI Risk Analytics Tool by Sector

Sector	Weekly or more	Monthly	Rarely or never	Total
IT and software services	41	14	5	60
Non-IT (construction and manufacturing)	19	59	42	120
Total	60	73	47	180

Chi-square = 19.37, $df = 2$, $p < 0.001$; Cramér's $V = 0.33$.

A statistically significant and moderately effect-sized difference exists between the percentage of IT project managers that utilize the AI risk analytics tool on a weekly or more often basis (68.3% of IT respondents) and their non-IT counterparts (15.8%).

6. Discussion

The findings provide solid evidence for UTAUT's central argument when applied to the unique setting of AI-driven risk analytics for project managers, and they also provide a useful extension. According to Gansser and Reich (2021), performance-related beliefs are typically the strongest predictors of intention to use AI tools. This finding aligns with common sense: a busy project manager is more likely to adopt a new tool when they believe it will actually improve their risk management, not just because it is trendy or required. A stronger driver of intention is performance expectation. Notably, and perhaps comfortingly, the impact of Social Influence (H3) was shown to be non-significant. It appears that this sample of project managers is not following orders from upper management or peers when determining whether to employ an AI risk analytics tool, but rather is basing their decision on their personal evaluation of the technology's utility and usability. This is in line with the overall trend found in numerous UTAUT studies (Williams et al., 2015), but organizations should exercise caution in assuming this will always be the case, as social influence may be more significant during the initial, unfamiliar phases of a new technology's implementation compared to its established phases.

An important practical takeaway from the discovery that Facilitating Conditions impact both intention and usage (H4) is that organizational support, including training, data access, and a functional help desk, is not a minor, background aspect; this finding mirrors the original UTAUT result from Venkatesh et al. (2003). It determines if project managers are interested

in using a tool and to what extent that interest develops into actual, long-term utilization. Nonetheless, the connection between Use Behaviour and Project Control (H5, second part) stands out as the most significant and legible result of this research. This finding takes the paper a step further than a typical technology-acceptance study. It gives evidence, in the form of numbers, that more AI risk analytics tools are linked to better project outcomes. This lends credence to the larger claim made by Zwikael and Ahn (2011), that real risk management effort pays off, and applies it specifically to AI-based tools. While it is true that AI risk analytics does play a role in improving project control, it should be noted that this does not come at the expense of the project manager's expertise, professional training, and the overall project management environment; rather, it should be considered complementary, as H6 confirms, and used in tandem with these factors.

7. Recommendations of the Study

1. Emphasize the ways in which AI risk analytics enhance the evaluation and making of decisions around risks.
2. Give project managers training that is both practical and with user-friendly interfaces.
3. Reliability in data access, technical support, and managerial backing must be guaranteed.
4. Get everyone on board with using AI tools regularly to keep projects under control.
5. Earn a credential in professional project management while gaining knowledge of artificial intelligence.
6. Rather than seeing AI risk analytics as a panacea for project management, consider it an auxiliary tool.

8. Limitations of the Study

Instead of using independently verified project data, this study depends on project managers' self-reported judgments of use behaviour and project control. This means that replies could be influenced by personal bias, such as an inclination to judge one's own performance favourably. Although the UTAUT model is in line with existing theory, the direction of causation cannot be established as firmly as it could be in a longitudinal study that follows the same project managers over time due to the cross-sectional design, which means that behavioural intention, use behaviour, and project control were all measured at a single point in time. Results should be interpreted as indicative of this sample rather than as representative, with statistical certainty, of all project managers using AI risk analytics tools. The sample was drawn from professional networks rather than a complete and verifiable sampling frame of all project managers using these tools, although it was still a reasonably sized sample across three sectors.

9. Conclusion

Project managers' adoption and utilization of AI-driven risk analytics tools, as well as the relationship between this adoption and improved project control, are questions that are becoming more important to project-based organizations. This study used UTAUT to examine these questions. Findings demonstrate that project managers' intentions to use these tools are strongly influenced by Performance Expectancy, Effort Expectancy, and Facilitating Conditions, rather than Social Influence. Intention and facilitating conditions jointly predict actual use, and most importantly, actual use is significantly and meaningfully linked to better control over project schedule, cost, and risk. It appears that AI-based tools and professional training complement each other rather than replace it, since project managers with a recognized qualification report even stronger project control.

The main takeaway from this paper is that AI risk analytics tools only help with project control when they are actually used, not just made available. The level of use is influenced by project managers' confidence in the tool's usefulness, how easy it is to use, and the support it receives from the organization, not to mention the algorithm's complexity. Consequently, businesses should put just as much effort into getting people to embrace and use the technology as they do into developing and implementing AI risk analytics if they want to enhance project control.

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