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Risk Identification and Project Performance in Libyan Construction Companies: Empirical Evidence from 240 Professionals

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ABSTRACT

This study examines whether systematic risk identification is associated with project performance in Libyan construction companies. A quantitative, cross-sectional survey was administered to 240 construction professionals selected through convenience sampling. Risk identification and project performance were measured using structured five-point Likert-scale items. Instrument reliability was acceptable for risk identification (Cronbach's alpha = 0.734) and strong for project performance (alpha = 0.888), while the full 27-item instrument reported alpha = 0.969. Pearson correlation and simple linear regression were used to test the proposed relationship. Risk identification was positively and significantly correlated with project performance ($r = 0.352$, $p < 0.001$). The regression model was statistically significant, $F(1, 238) = 33.711$, $p < 0.001$, and explained 12.4% of the variance in project performance (R-squared = 0.124). The unstandardized coefficient ($B = 0.468$) indicates that higher reported risk-identification practice predicts higher reported performance. The findings support institutionalizing early and recurring risk registers, cross-functional stakeholder workshops, lessons-learned reviews, and periodic risk updates linked to project decisions. However, the modest explanatory power shows that risk identification is only one component of a wider performance system. Because the design is cross-sectional, self-reported, and based on non-probability sampling, the results establish association and prediction rather than causality and should be interpreted within these methodological limits.

1. INTRODUCTION

Construction projects operate under uncertainty generated by technical complexity, fragmented contractual relationships, changing market conditions, regulatory demands, and site-specific constraints. When uncertainty is not identified early, it can become embedded in schedules, budgets, procurement plans, and design decisions. The result is often reactive management: teams discover threats only after they have affected cost, time, quality, safety, or stakeholder expectations. Risk identification is therefore not merely a preliminary administrative exercise; it is the entry point through which uncertainty becomes visible, discussable, assignable, and manageable.

The problem is especially consequential in volatile project environments. Libyan construction companies must often work amid economic fluctuations, logistical interruptions, institutional ambiguity, and uneven organizational capability. Such conditions increase both the number of potential risks and the speed at which they can change. Yet formal risk-identification routines are not uniformly institutionalized. Informal reliance on personal experience may detect familiar hazards, but it can overlook interface risks, low-frequency high-impact events, and threats that fall between organizational responsibilities. A systematic process can broaden the information base through checklists, expert judgment, stakeholder workshops, lessons learned, document review, and structured risk registers. Prior studies generally associate risk-management maturity with stronger project outcomes, but several gaps remain. First, evidence from stable markets cannot be assumed to transfer directly to Libya. Second, broad models that combine identification, assessment, response, monitoring, tools, culture, compliance, and risk allocation can conceal the distinct contribution of the initial identification stage. Third, claims of causality are often stronger than the underlying cross-sectional evidence permits. This article addresses these issues by testing a focused research question and hypothesis and examining the statistical contribution of risk identification to project performance among Libyan construction professionals. The central research problem is the limited empirical clarity regarding whether systematic risk identification is associated with better project performance in Libyan construction companies. Although theory positions identification as the foundation of risk management, firms may treat it as a one-time checklist rather than a continuing process linked to decisions. Without local evidence, managers have limited grounds for deciding whether investment in identification routines is likely to correspond with measurable performance benefits. Accordingly, the study addresses the following central question: Is there a significant positive relationship between risk identification and project performance in Libyan construction companies? The study therefore aims to assess the direction, strength, and predictive contribution of risk identification in relation to project performance within Libyan construction companies. Accordingly, the study tests the hypothesis that there is a statistically significant positive relationship between risk identification and project performance in Libyan construction companies. The article offers theoretical, empirical, and managerial value. Theoretically, it focuses on the first stage of the risk-management cycle and clarifies why later assessment and response depend on the quality of the initial risk inventory. Empirically, it reports effect size, explained variance, and regression estimates from 240 respondents rather than relying only on general perceptions. Managerially, it translates the findings into implementable routines suitable for firms operating under uncertainty. The study also establishes a disciplined boundary: the evidence supports association and prediction, not definitive causal attribution. Risk identification is the systematic process of recognizing events, conditions, sources, and interactions that may affect project objectives. In construction, identification must cover more than isolated hazards. It should consider risks arising from scope definition, design coordination, ground conditions, procurement, labor and equipment availability, contractor capacity, approvals, finance, inflation, security, stakeholder behavior, and contractual interfaces. (Al-Bahar and Crandall, 1990) framed construction risk management as a systematic process, while Batson (2009) emphasized the value of identification methods during planning and execution. The practical implication is that identification should be iterative: risks discovered at feasibility are not identical to those emerging during design, procurement, or construction. A useful identification system produces a documented and prioritized risk register containing descriptions, causes, potential consequences, early warning indicators, owners, and review dates. The register is valuable only when linked to governance. If risks are listed but not assigned, updated, or escalated, identification becomes ceremonial. (Hillson, 2020) argues for structured and proactive methods that distinguish threats and opportunities and convert uncertain events into actionable management information. (Aven, 2016) similarly stresses the conceptual foundation of risk assessment and the need to make uncertainty explicit. Construction organizations commonly use brainstorming, expert interviews, historical records, checklists, work breakdown structures, SWOT analysis, site inspections, and scenario analysis. More analytical techniques, including fuzzy FMEA, multi-criteria decision methods, and structural models, can deepen identification where data and expertise permit (Ahmadi et al., 2016; Eybpoosh et al., 2011). However, sophisticated tools do not replace organizational participation. Frontline engineers, planners, commercial staff, contractors, clients, and regulators hold different fragments of risk information; workshops and cross-functional reviews can reveal interface threats that no single actor sees. Project performance is traditionally assessed through adherence to cost, time, and quality objectives. These dimensions remain central because delay, cost overrun, and nonconforming work directly affect clients, contractors, and public value. Nevertheless, performance is multidimensional and may also include safety, stakeholder satisfaction, functional outcomes, and organizational learning. (Hughes, Tippett, and Thomas, 2004) highlighted the importance of clear performance measurement in construction. In the present study, the dependent construct reflects respondents' assessments of project outcomes, with emphasis on cost, time, and quality. Risk identification can influence performance through several mechanisms.

Early visibility permits realistic contingencies, more credible schedules, targeted investigations, clearer allocation of responsibilities, and timely mitigation. It can reduce decision latency because managers have already considered warning signs and response options. Identification can also improve communication by creating a common vocabulary for uncertainty. Conversely, incomplete identification produces hidden assumptions and unowned exposures, which can later manifest as disruption. These mechanisms make a positive relationship theoretically plausible, while leaving room for other determinants such as leadership, finance, competence, regulation, and market conditions. Research across construction settings generally finds that structured risk management practices are associated with improved project outcomes. (Tadayon, Jaafar, and Nasri, 2012) examined risk identification in large construction projects and underlined the importance of disciplined recognition of exposures. (Dziadosz and Rejment, 2015) reviewed risk-analysis methods and showed the value of aligning technique selection with the project context. (Salleh et al., 2018) reported that implementation remains uneven across the construction industry, while (Odimabo, Oduoza, & Suresh, 2018) emphasized the interaction between processes, tools, and organizational use. Evidence from developing and emerging markets is particularly relevant because formal systems frequently coexist with institutional volatility and resource constraints. (Chileshe and Kikwasi, 2014) identified critical success factors affecting the implementation of risk assessment and management in Tanzania. (Kumar and Sood, 2023) likewise examined construction risk management approaches in an Indian context. In Libya, (Ali et al, 2023) considered the effect of risk-management practices on project performance, and (Elhoush and Kulatunga, 2017) examined effectiveness in the oil and gas sector. These studies reinforce the need for context-specific evidence rather than mechanical transfer of practices developed elsewhere. Despite broad agreement on the value of risk management, the expected effect of risk identification alone should not be exaggerated. Identification is necessary but insufficient: risks must also be assessed, allocated, monitored, and addressed. A moderate association is therefore more theoretically credible than a near-deterministic relationship. This expectation is consistent with a systems perspective in which project performance arises from multiple interacting capabilities. The present model accordingly tests whether identification contributes significantly while recognizing that most performance variances are likely to remain attributable to other factors.

Table1. Conceptual relationship tested in the study

Independent variable	Expected relationship	Dependent variable
Risk identification	Positive (+)	Project performance (cost, time, quality)

Source: Developed from the research question and Hypothesis H1.

2. METHOD

The study used a quantitative, cross-sectional survey design. This design was appropriate for measuring professional perceptions consistently and testing the relationship between two constructs using inferential statistics. The analysis isolates risk identification as the independent variable and project performance as the dependent variable. The unit of analysis is the individual construction professional.

The target population comprised professionals working in the Libyan construction industry, including project managers, senior managers, risk-management personnel, contractors, engineers, and other relevant stakeholders. Convenience sampling was used because professionals with direct project and risk-management experience were not readily accessible through a comprehensive sampling frame. A total of 240 valid responses were included. The sample is adequate for the reported correlation and simple regression; nevertheless, non-probability selection limits statistical generalization to the entire Libyan construction workforce.

Data were collected using a structured questionnaire with demographic items and five-point Likert-scale statements ranging from 1 (strongly disagree) to 5 (strongly agree). The focal independent construct, risk identification, comprised three items concerning systematic recognition of potential risks, early identification, and use of an organized process. Project performance comprised three items reflecting project outcomes, particularly cost, time, and quality. The questionnaire was reviewed and pilot-tested before full deployment and demonstrated satisfactory internal consistency.

Table 1. Constructs and measurement characteristics

Construct	Role	Items	Scale	Cronbach's alpha
Risk identification	Independent	3	1-5 Likert	0.734
Project performance	Dependent	3	1-5 Likert	0.888

Source: Prepared by the researchers from the study data.

The analysis used SPSS and proceeded in three stages. First, Cronbach's alpha assessed internal consistency. Second, Pearson's product-moment correlation evaluated the strength and direction of the bivariate relationship. Third, simple linear regression estimated the predictive contribution of risk identification to project performance. Statistical significance was assessed using a two-tailed threshold of $p < 0.05$. The regression specification was Project Performance = beta-zero + beta-one (Risk Identification) + error. Model interpretation considered R, R-squared, the ANOVA F statistic, the unstandardized coefficient B, the standardized coefficient beta, and the t statistic.

3. ETHIC APPROVAL

Participation was voluntary and based on informed consent. Respondents were informed of the academic purpose of the research, and confidentiality and anonymity were maintained. Data were presented in aggregate form. These procedures reduce, but do not eliminate, the possibility of social-desirability or common-method bias in self-reported responses.

4. RESULT

The risk-identification scale achieved Cronbach's alpha of 0.734, exceeding the commonly applied 0.70 threshold and indicating acceptable internal consistency. The project-performance scale achieved alpha of 0.888, indicating strong reliability. The full 27-item research instrument reported an alpha of 0.969. These values support composite-scale analysis, although the very high overall coefficient may also reflect overlap among broader risk-management dimensions.

Pearson correlation showed a positive, statistically significant relationship between risk identification and project performance, $r = 0.352$, $p < 0.001$, based on 240 observations. The coefficient indicates a modest-to-moderate association: respondents reporting more systematic risk identification also tended to report better project performance. The result supports the directional expectation in H1 but does not imply that identification alone determines performance.

Table 2. Pearson correlation between risk identification and project performance

Variables	1	2
1. Risk identification	1.000	0.352**
2. Project performance	0.352**	1.000

*Note: N = 240. ** Correlation is significant at the 0.01 level (two-tailed). Source: Prepared by the researchers from the study data.*

The simple regression model produced R = 0.352 and R-squared = 0.124 (adjusted R-squared = 0.120). Thus, risk identification accounted for 12.4% of the observed variance in project performance. The model was statistically significant, $F(1, 238) = 33.711$, $p < 0.001$. The residual standard error was 1.18593. Although significant, the R-squared value also demonstrates that 87.6% of performance variance lies outside this single-predictor model.

Table 3. Model summary for Hypothesis H1

R	R-squared	Adjusted R-squared	Std. error of estimate
0.352	0.124	0.120	1.18593

Source: Prepared by the researchers from the study data.

Table 4. ANOVA for the regression model

Source	Sum of squares	df	Mean square	F	p
Regression	47.412	1	47.412	33.711	<0.001
Residual	334.732	238	1.406		
Total	382.144	239			

Dependent variable: project performance. Predictor: risk identification. Source: Prepared by the researchers from the study data.

Table 5. Regression coefficients

Term	B	Std. error	Beta	t	p
Constant	1.475	0.282	-	5.228	<0.001
Risk identification	0.468	0.081	0.352	5.806	<0.001

Dependent variable: project performance. Source: Prepared by the researchers from the study data.

The estimated equation is Project Performance = 1.475 + 0.468(Risk Identification). Holding the scale specification constant, a one-unit increase in reported risk identification is associated with a 0.468-unit increase in reported project performance. Because the data are cross-sectional and self-reported, this coefficient should be described as an association or prediction rather than a causal effect.

The hypothesis is supported: there is a statistically significant positive relationship between risk identification and project performance in the sampled Libyan construction companies. This decision is based on the positive Pearson coefficient, the significant regression model, and the positive regression slope. The practical magnitude is meaningful but limited, indicating that identification is one contributor within a wider performance system.

5. DISCUSSION

The finding that risk identification is positively related to project performance is consistent with the logic of systematic construction risk management. Identification enables managers to recognize threats before they crystallize into delay, cost escalation, quality failure, or contractual conflict. This interpretation aligns with (Al-Bahar and Crandall's 1990) systematic approach and with (Batson's, 2009) emphasis on identification during construction planning and execution. It also supports (Hillson’s, 2020) argument that proactive risk work improves the quality of managerial attention and response.

The effect, however, is not large enough to justify treating risk identification as a stand-alone solution. An R-squared of 0.124 means that the model explains a meaningful portion of performance differences, but most variance remains unexplained. This is theoretically reasonable. Identifying a threat does not guarantee that it will be accurately assessed, assigned to a capable owner, financed, monitored, or mitigated. Project performance also depends on governance, competencies, contractual design, access to resources, political and economic conditions, and coordination among stakeholders. Managers who merely produce risk lists without decision rights, budgets, and follow-up may gain documentation but little performance improvement.

The Libyan context strengthens the practical relevance of early identification. Volatility can shorten the interval between a warning signal and a project impact. Firms therefore need processes that detect changing exchange conditions, supply interruptions, regulatory ambiguity, security issues, and stakeholder constraints early enough for action. A static register prepared for the project start is inadequate. Identification should be repeated at phase gates, before major procurement commitments, after material scope changes, and when external conditions shift.

The results also reveal an interpretive weakness common in applied project research: statistical significance can be mistaken for strong explanatory power or causality. Here, $p < 0.001$ indicates that the observed association is unlikely to be zero under the model assumptions; it does not mean that risk identification explains most performance outcomes. Nor does the coefficient prove that increasing identification by itself will cause a precise performance improvement. Reverse influence is possible: better-performing firms may have stronger processes generally, including better identification. Common-method variance may also inflate the relationship because both constructs were reported by the same respondents at the same time.

Compared with broader studies of risk-management implementation, the focused result adds diagnostic value. Studies such as (Salleh et al, 2018) and (Odimabo et al, 2018) consider combinations of processes and tools. By isolating identification, this analysis shows that the first stage has an independent bivariate relationship with performance, while also illustrating why integrated systems are necessary.

The finding complements work on analytical methods (Ahmadi et al., 2016; Dziadosz & Rejment, 2015) but suggests that organizations should first secure consistent participation and governance before investing heavily in complex techniques. The evidence supports a move from informal, experience-dependent identification to a repeatable organizational routine.

Libyan construction companies can operationalize this finding through five linked practices. First, every project should establish a live risk register at initiation, with clear causes, consequences, owners, triggers, and review dates. Second, facilitated identification workshops should involve design, planning, commercial, procurement, site, client, and contractor representatives.

Third, lessons from completed and troubled projects should be stored in a searchable organizational repository. Fourth, risk review should be embedded in monthly progress meetings and phase-gate decisions. Fifth, high-priority risks should be connected directly to contingency budgets, schedule allowances, contractual actions, and escalation thresholds.

Management should avoid measuring maturity by the number of risks recorded. A long register can conceal weak prioritization. More useful indicators include the proportion of major risks with named owners, the percentage reviewed on time, the number of risks detected before impact, the response-closure rate, and the variance between forecast and actual exposure. These indicators make identification accountable and connect it with decisions. Training should likewise focus on causal descriptions, interface analysis, warning indicators, and ownership rather than only on terminology.

Policy makers and major clients can reinforce the practice by requiring evidence of risk workshops, updated registers, and allocation decisions at tender, award, and progress stages. Contracting arrangements should assign risks to the party best able to control them rather than transferring them indiscriminately. Digital tools, including BIM-linked issue systems and shared dashboards, can improve visibility, but technology should support, not substitute for, clear governance and professional judgment.

Several limitations qualify the findings. Convenience sampling means that inclusion probabilities were unknown, so the sample cannot be claimed to represent all Libyan construction professionals statistically. The cross-sectional design captures perceptions at one point in time and cannot establish temporal order. Both variables were measured through the same questionnaire, creating possible common-method and social-desirability bias. The model uses a single predictor and therefore omits relevant organizational and environmental determinants. Finally, project performance is perception-based rather than verified against archival cost, schedule, and quality records.

Future research should use stratified or multi-stage probability sampling where feasible and distinguish firms by size, ownership, region, project type, and risk maturity. Longitudinal designs could test whether improvements in identification precede performance changes. Multi-source data should combine manager surveys with objective schedule variance, cost variance, defects, claims, and safety indicators. Hierarchical or structural-equation models could assess mediation through assessment, response planning, monitoring, and risk culture. Qualitative interviews would also help explain why some identified risks receive action while others remain unowned or unfunded.

6. CONCLUSION

This study tested one focused hypothesis from a broader investigation of risk management in Libyan construction companies. Based on 240 professional responses, risk identification was positively and significantly associated with project performance ($r = 0.352$, $p < 0.001$). The simple regression model explained 12.4% of performance variance, and the positive slope ($B = 0.468$) supported H1. The evidence therefore justifies greater managerial attention to systematic, iterative, and participatory identification practices.

The main conclusion is deliberately balanced. Risk identification matters, but it is not sufficient. Its value is realized when identified threats are assessed, assigned, resourced, monitored, and connected to decisions. Libyan construction companies should institutionalize early and recurring identification while measuring whether risks are acted upon, not merely recorded. Stronger research designs are needed before causal claims can be made, yet the present results provide a credible empirical basis for treating identification as a foundational capability in project-performance improvement.

Regarding data availability, the underlying respondent-level data are subject to the researchers' ethical and institutional commitments and may be made available upon reasonable request, where permitted.

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