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Original Research Article

Partner Selection Dynamics and Risk Management in Strategic Alliances: Evidence from Iranian Aerospace SMEs

Amin Salari [1], Taghi Torabi [*2], Reza Radfar [1], and Alireza Poorebrahimi [3]

1. Department of Management, Science and Research Branch, Islamic Azad University, Tehran, Iran

2. Department of Economy, Science and Research Branch, Islamic Azad University, Tehran, Iran

3. Department of Industrial Engineering, Karaj Branch, Islamic Azad University, Karaj, Iran

*** dr.taghi.torabi@gmail.com**

Abstract

Strategic alliances are vital for organizations seeking competitive advantage, access to new markets, and opportunities to share resources. However, forming such alliances entails considerable risks, particularly in the area of partner selection. This study integrates insights from existing literature with empirical evidence from Iranian small and medium-sized enterprises (SMEs) in the aerospace sector to identify key criteria influencing partner selection and their evolving importance after alliance formation. The findings highlight that technological capability, financial health, and prior experience are critical factors in the initial stages of partner selection, while aspects such as managerial compatibility and cultural alignment gain significance as alliances progress. The research underscores the dynamic nature of strategic partnerships and emphasizes the necessity of continuous evaluation to ensure long-term effectiveness. By addressing the interplay between trust and risk and exploring the complexities of interrelated variables, the study contributes to the refinement of risk management frameworks. The results provide both theoretical insights and practical guidance for organizations aiming to improve their strategic decision-making in forming and sustaining successful alliances.

Keywords: Aerospace Sector; Cultural Alignment; Financial Health; Partner Selection; Risk Management; SMEs (Small and Medium-sized Enterprises); Strategic Alliances; Technological Compatibility; Trust and Risk Balance.

1. Introduction

Strategic alliances are very important to organizations for developing competitive advantage, gaining access to new markets, and sharing resources. There are a great number of risks in establishing such alliances, particularly in partner selection. This literature review discusses current studies on risk management techniques in strategic alliances, with an emphasis on the partner selection process.

2. Literature Review

2.1 Balancing Risk and Trust

Collier, Wood, and Henderson reiterate that, in the development of strategic alliances, the balance between risk and trust is precarious [1]. According to Collier and his colleagues, the establishment of strategic alliances requires a balancing act between trust and risk. Their study emphasizes how important trust and cautious information gathering are in the selection of a partner. They provide a quantitative approach that can be used by decision-makers to evaluate potential partners based on reliability and risk factors. This model identifies partners as reliable and capable of delivering their promises, thus minimizing risks.

2.2 Framework for Partner Selection

Vaez-Alaei et al. provide a comprehensive methodology for selecting strategic alliance partners [2]. Much of their study's thrust is directed at matching the partner

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competencies with the exact needs of the project. Organizations can reduce the chance of misalignment and resulting risks by taking this route. Cultural alignment, strategic fit, and technological compatibility are aspects that form part of the framework that successful partnerships rely on.

Their framework emphasizes cultural alignment, strategic fit, and technological compatibility as critical factors that can mitigate risks associated with misalignment. This is further supported by Salama et al., who argue that a lack of cultural and strategic alignment can lead to conflicts and ultimately the breakdown of alliances [3].

2.3 Comprehensive Risk Management

Das & Teng provide a comprehensive review of risk management over the lifecycle of a partnership. Critical risk concerns are identified for every level, from the selection of partners to the implementation and termination of alliances [4].

The authors argue that proactive risk management is a prerequisite during the partner selection phase if the alliance is to achieve its objectives in the long term. They propose an approach that incorporates structured risk assessment, scenario planning, and due diligence as means of evaluating a potential partner.

Furlotti & Soda provide a thorough review of risk management throughout the lifecycle of a partnership, identifying critical risks at each stage—from partner selection to implementation and termination [5]. They advocate for structured risk assessments, scenario planning, and due diligence as essential tools for evaluating potential partners. This proactive approach is confirmed by Lee et al., who explore various strategies for minimizing risks, including scenario planning and comprehensive risk assessments [6].

2.4 Additional Insights

Vaez-Alaei et al. present a critical review of the literature on partner selection in strategic alliances, integrating multiple strategies and underlining the key factors influencing the success of an alliance. Their study emphasizes how risk reduction and alignment of strategy are paramount in partner selection [2].

The approach of Dorobantu et al. to strategic risk management within a multi-stage framework is remarkably attentive to an extremely extended stage of partner selection. Their paper indeed contains some valuable suggestions for the identification and mitigation of risks that may be associated with the potential partners [7].

2.5 Information gathering and trust

In their later study of the role of trust in strategic alliances, Collier, Wood, and Henderson mention that information-seeking activities have to be conducted to ascertain the level of reliability of the partner. To simplify the process of the partner analysis, they provide the grading sheet and a list of the reliability indicators [1].

Their grading sheet and list of reliability indicators simplify the partner analysis process done by Werneck & Rocha, reinforcing the idea that trust is foundational to successful alliances [8]. This aligns with the findings of Piroozi and colleagues, who suggest that high levels of social capital can enhance cooperation and mutual trust, thereby reducing risks [9].

2.6 Strategies for Risk Mitigation

Das and Tengexplore the different ways one could go about minimizing risk in choosing a partner. According to them, one needs to identify and mitigate all the conceivable risks by using methods like scenario planning, due diligence, and application of the techniques of risk assessment [4].

2.7 Cultural Fit and Strategic Alignment

Alyakhri et al explore the issue of cultural alignment and strategic fit in partner finding [10]. Their findings indicate that a lack of cultural and strategic alignment may result in conflict and breakdown of alliances. The authors also provide a model through which cultural compatibility and strategic fit could be analyzed.

Chang et al. discuss how technological compatibility can influence cooperation and creativity, suggesting that mismatches in technology can hinder alliance effectiveness [11]. Additionally, Praveena and Balajee emphasize the importance of analyzing the performance and financial stability of potential partners [12], providing metrics for evaluating financial health [13]. This multifaceted approach to partner selection is crucial for minimizing risks and ensuring alignment.

2.8 Technology Compatibility

Yin et al. focus on aspects that relate to how strategic partnerships rely on the issues of technology compatibility [14]. The authors argue that cooperation and creativity may be hindered by technological mismatch. Their work provides guidelines on how to assess technological compatibility during the selection of a partner.

2.9 Performance and Financial Stability

Praveena and Balajee emphasize that it is of great importance to analyze the performance and financial status of potential partners [12]. For evaluating the financial health of the potential partner, they present a set of financial measures and performance metrics.

2.10 Legislative and Legal Considerations

Tjemkes, Vos, and Burgers discuss the legal and regulatory issues related to strategic alliances. The

authors underline that deep legal due diligence is highly required in identifying the potential legal risks to be faced, as well as the compliance with relevant legislation [15].

Guo et al. address the legal and regulatory aspects of strategic alliances, highlighting the necessity of thorough legal due diligence to identify potential legal risks and ensure compliance with relevant legislation [16]. This legal perspective is essential for mitigating risks that could jeopardize the alliance's success.

2.11 Dynamic Capabilities and Alliance Success

Memedio et al. investigate how dynamic capabilities impact the success of strategic alliances [17]. The findings of the survey portion reveal that organizations with high levels of dynamic skills have better risk management and adaptation to changes in alliance circumstances. Furthermore, Grant and Baden-Fuller argue that effective knowledge exchange mechanisms can minimize risks while fostering innovation, thereby enhancing the overall performance of alliances [18].

2.12 Performance of Alliance and Social Capital

Suseno et al. researched the effect of social capital on the performance of an alliance [19]. They suggest that a high level of social capital may decrease risk by increasing cooperation and mutual trust between the partners.

2.13 Innovation and Knowledge Exchange

Grant and Baden-Fuller address knowledge exchange and innovation in strategic alliances [18]. The authors maintain that appropriate mechanisms for knowledge exchange can minimize risks while increasing innovation.

From the literature review, the magnitude of risk management in the development of strategic partnerships is clearly seen, especially in the selection of partners. For any relationship to work, trust, capabilities alignment, and comprehensive risk assessment must come into play. Future studies could develop more sophisticated models regarding risk management in strategic partnerships and explore in greater detail the dynamics of these interacting variables.

3. Methodology

After determining the criteria for selecting partners using the literature, the criteria for selecting partners from the perspective of Iranian small and medium-sized enterprises (SMEs) related to the aerospace sector are examined using a questionnaire derived from scientific articles, whose validity and reliability have already been assessed. The results are analyzed using the one-sample t-test and SPSS software.

Initially, a preliminary sample of 23 was selected. The standard deviation and standard error mean from this preliminary sample were used in the formula. The minimum required sample size was calculated using the following formula, which is used for sampling from a small population:

$$n = \frac{N Z_{\frac{\alpha}{2}}^2 \sigma^2}{\varepsilon^2 (N-1) + Z_{\frac{\alpha}{2}}^2 \sigma^2} = \frac{(130)(1.96)^2(0.63)^2}{(0.13)^2(130-1) + (1.96)^2(0.63)^2} = \frac{198.215}{3.7} = 53.57 \approx 54 \quad (1)$$

where:

N = 130 (population size: total Iranian aerospace SMEs)

Z = 1.96 (95% confidence level)

σ = 0.63 (standard deviation from pilot study)

ε = 0.13 (maximum acceptable error)

A total of 130 questionnaires were distributed over four months via email, fax, and in-person visits among Iranian SMEs engaged in aerospace-related activities. Out of these, 61 questionnaires were returned, resulting in a response rate of 47%. Three questionnaires with extreme outliers that distorted the statistical results were excluded, leaving 58 usable questionnaires. Since the questionnaire was related to contracts that play a strategic role in companies, it was requested that the CEO or another manager with sufficient information or experience in this regard fill out the questionnaire.

3.1 Measurement Validity and Reliability Assessment

3.1.1 Instrument Development and Content Validity

The measurement instrument was developed through a systematic review and synthesis of validated questionnaires from prior empirical research in strategic alliance partner selection. Rather than developing novel measures requiring exploratory psychometric validation, we adopted a theory-driven approach by selecting items from instruments that had undergone rigorous validation in previous studies. This strategy ensures content validity, as the items comprehensively represent the theoretical domains of each construct.

Each of the nine partner selection criteria and their constituent items were drawn from established research:

- Previous Experience (4 items): Adapted from Collier, Wood, and Henderson [1], measuring prior successful partnerships, alliance experience, investment project experience, and knowledge acquisition capability.
- Financial Health (4 items): Based on Praveena and Balajee, assessing return on investment, debt ratio, payment capability, future profitability, and growth potential [12].

- Strategic Compatibility and Goal Alignment (2 items): Derived from Vaez-Alaei et al. [2] and Alyakhri et al [10], measuring strategic alignment and business relationship compatibility.
- Managerial Compatibility and Ability (3 items): Adapted from Alyakhri et al [10], evaluating mutual trust and commitment, managerial style compatibility, and administrative efficiency.
- Technological Capability and Innovation Level (5 items): Based on Yin et al. [14], measuring R&D investment, process design and innovation skills, new technology development potential, technology transfer transparency, and technological expertise.
- Complementary Resources: Conceptualized following Grant and Baden-Fuller [18], assessing human, technological, financial, skill, knowledge, and R&D resources available through alliance formation.
- Reputation and Goodwill (2 items): Adapted from Suseno et al. [19], measuring industry reputation and inter-company collaboration reputation.
- Company Size (2 items): Operationalized through the number of employees and capital investment, consistent with standard organizational research practices.
- Structural and Cultural Compatibility (3 items): Based on Alyakhri et al [10] and Salama et al [3], assessing organizational culture, scale, and perspective compatibility, and organizational structure effectiveness.

All items utilized a 5-point Likert scale (1 = very unimportant to 5 = very important) and were assessed at two time points: before alliance formation (present) and anticipated importance after alliance formation (future). This temporal design enables examination of partner selection criteria's dynamic nature throughout the alliance lifecycle.

Next, we needed information about the companies under consideration for ranking. The necessary information in this section was obtained using an existing questionnaire in the company, along with other available information about them and the opinion of the CEO as an expert. The companies were then ranked using the TOPSIS method.

Table 1. Summary of the questionnaire

Effective Criteria for Selecting Partners for Forming Strategic Alliances	Explanation
Previous Experiences	Previous successful partnerships between partners, experience in alliances and inter-company collaborations, experience in investment and operational projects, partners' experience in acquiring knowledge from the partner.
Financial Health	Return on investment in the last 5 years, debt ratio, future payment ability, growth potential, future profitability.
Strategic Compatibility and Goal Alignment	Alignment and compatibility of the company's core programs, goal alignment, business relationships with partners, and non-conflicting goals of partners.
Managerial Compatibility and Ability	Mutual trust and commitment between company managers, blending managerial style and culture with partners, administrative efficiency, and managerial ability.
Technological Capability and Innovation Level	Investment in R&D, number and quality of employees, financial capital, process design and innovation skills, potential to create and develop new technologies, transparency in technology development and transfer, expertise, knowledge skills, technology application.
Complementary Resources	Human, technological, financial, skill, knowledge, R&D resources that each company alone does not possess entirely and are available through alliances and collaborations of different companies.
Reputation and Goodwill	Partner's reputation in the relevant industry, partner's reputation in inter-company collaborations.
Company Size	Company size can be measured by the number of employees, capital, and company investments.
Structural and Cultural Compatibility	Managerial and organizational culture, scale and viewpoint compatibility, organizational structure effectiveness.

3.1.2 Partner Ranking Using the TOPSIS Method

After identifying the importance of partner selection criteria through statistical analysis (one-sample t-tests and paired t-tests), we employed the Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS) method to rank potential partner companies. TOPSIS is a multi-criteria decision-making (MCDM) technique that evaluates alternatives based on their geometric distance from the ideal solution.

3.1.3 TOPSIS Implementation Process

The TOPSIS method was implemented in five steps:

Step 1: Decision Matrix Construction. We constructed a decision matrix for the companies under consideration, using the nine partner selection criteria identified in our study:

- Previous Experience
- Financial Health
- Strategic Compatibility and Goal Alignment
- Managerial Compatibility and Ability
- Technological Capability and Innovation Level
- Complementary Resources
- Reputation and Goodwill
- Company Size
- Structural and Cultural Compatibility

Data for each company was obtained through:

- Company questionnaires completed by CEOs or senior managers
- Publicly available company information
- Expert assessment by the CEO as a domain expert

Step 2: Normalization. The decision matrix was normalized using vector normalization to create a comparable scale across all criteria:

$$r_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^{m} x_{ij}^2}} \quad (2)$$

where r_{ij} is the normalized value, x_{ij} is the original value for company i on criterion j, and m is the number of companies.

Step 3: Weighted Normalized Decision Matrix. The normalized values were weighted using the importance weights derived from our statistical analysis. The mean importance scores from Tables 5 and 7 (before and after alliance formation) served as weights, ensuring that the ranking reflected the empirically validated criterion importance.

Step 4: Ideal and Negative-Ideal Solutions. We determined:

- Positive Ideal Solution (PIS): The best value for each criterion across all companies
- Negative Ideal Solution (NIS): The worst value for each criterion across all companies

Step 5: Closeness Coefficient Calculation. For each company, we calculated the closeness coefficient (CC):

$$CC_i = \frac{D_i^-}{D_i^+ + D_i^-} \quad (3)$$

where D_i^+ is the Euclidean distance from the positive ideal solution and D_i^- is the distance from the negative ideal solution. Companies were then ranked in descending order of their closeness coefficients.

3.1.4 Integration with Statistical Analysis

The TOPSIS method complements our t-test analysis in the following ways:

- Criterion Importance Integration: While t-tests established which criteria are statistically significant and how their importance changes over time, TOPSIS uses these validated importance weights to rank actual partner companies.
- Practical Application: T-tests answered the research question "Which criteria matter?" while TOPSIS answered the practical question "Which partners are best?"
- Dynamic Weighting: We applied TOPSIS twice—once using pre-alliance importance weights (Table 5) and once using post-alliance weights (Table 7)—to demonstrate how partner rankings might shift as alliance priorities evolve.

This integrated approach provides both theoretical insights (from statistical analysis) and practical guidance (from TOPSIS rankings) for partner selection in Iranian aerospace SMEs.

3.1.5 Internal Consistency Reliability

Internal consistency reliability for each factor was assessed using Cronbach's alpha coefficient, the most widely employed measure of scale reliability. Table 2 presents the reliability coefficients for all factors. All factors demonstrated acceptable to excellent internal consistency (α range: 0.74–0.88), substantially exceeding the conventional threshold of 0.70 recommended for established scales.

Table 2. Internal consistency reliability of partner selection criteria

Partner Selection Criterion	Number of Items	Cronbach's α	Reliability
Technological Capability and Innovation Level	5	0.85	Good
Reputation and Goodwill	2	0.88	Good
Financial Health	4	0.82	Good
Managerial Compatibility and Ability	3	0.81	Good
Strategic Compatibility and Goal Alignment	2	0.79	Acceptable
Cultural and Structural Compatibility	3	0.78	Acceptable
Previous Experience	4	0.76	Acceptable
Company Size	2	0.74	Acceptable

Note: $\alpha > 0.80$ = good; $0.70 \leq \alpha \leq 0.80$ = acceptable

These reliability coefficients confirm the internal consistency of the measurement scales, indicating that items within each factor measure a coherent underlying construct. The higher reliability coefficients for multi-item scales (e.g., Technological Capability: α = 0.85) compared to two-item scales (e.g., Company Size: α = 0.74) are consistent with psychometric theory, as reliability increases with the number of items.

3.1.6 Construct Validity: Convergent and Discriminant Evidence

Convergent validity was assessed through examination of inter-temporal correlations between the same constructs measured at two time points (before and after alliance formation). As shown in Table 3, all factors demonstrated significant positive correlations (r range: .499–.885, all p < .001), supporting the stability and convergent validity of the measures.

Table 3. Inter-temporal correlations (convergent validity evidence)

Partner Selection Criterion	r (Present-Future)	p-value	Stability
Company Size	.885	<.001	Strong
Complementary Resources	.823	<.001	Strong
Strategic Compatibility	.753	<.001	Strong
Managerial Compatibility	.676	<.001	Moderate-Strong
Financial Health	.642	<.001	Moderate
Reputation	.624	<.001	Moderate
Cultural Compatibility	.609	<.001	Moderate
Previous Experience	.598	<.001	Moderate
Technological Capability	.499	<.001	Moderate

Note: All correlations are significant at p < .001 (two-tailed)

The moderate to strong correlations demonstrate that respondents' assessments of partner selection criteria show meaningful consistency across temporal contexts, while allowing for theoretically expected shifts in criterion importance as alliances progress from formation to post-formation stages. The somewhat lower correlation for Technological Capability (r = .499) may reflect the dynamic and evolving nature of technology-related considerations in aerospace alliances.

These findings provide evidence of convergent validity—that measures of the same construct at different time points correlate substantially with each other. Discriminant validity is supported by the conceptual distinctiveness of the factors, each representing theoretically distinct dimensions of partner selection derived from different literature streams.

3.2 Rationale for Confirmatory Rather Than Exploratory Factor Analysis

Given the study design and sample characteristics, we adopted a confirmatory rather than exploratory approach to construct validation. This decision was based on several methodological considerations:

1. Pre-Validated Instruments: Each factor was operationalized using items from instruments that had undergone exploratory factor analysis and validation in prior research. The factor structure was therefore established a priori based on theoretical foundations and empirical evidence from multiple studies ([1]; [12]; [14]; [10]).

2. Sample Size Considerations: While our sample (N = 58) exceeds the calculated minimum required for adequate statistical power in our primary analyses (n = 54), it falls below the typically recommended sample size for stable exploratory factor analysis. Methodological research suggests that reliable EFA requires subject-to-item ratios of at least 5:1, and preferably 10. With 25 questionnaire items, this would require 125–250 respondents for stable factor extraction.

3. Research Design: Our study focuses on testing established theoretical relationships and examining temporal dynamics of partner selection criteria, rather than discovering or developing new measurement scales. This confirmatory objective aligns with the use of validated instruments rather than exploratory scale development.

4. Population Constraints: The specialized nature of our population (Iranian aerospace SMEs) limits the available sampling frame. The 58 respondents represent a substantial proportion of the target population, providing adequate representativeness despite the modest absolute sample size.

5. Alternative Validity Evidence: We provide multiple forms of validity evidence appropriate for our research design: content validity through systematic item selection from validated sources, reliability through internal consistency analysis, and convergent validity through inter-temporal correlations. This multi-method approach to validation is consistent with contemporary measurement validity frameworks.

3.3 Justification for Parametric Statistical Methods

Given the ordinal nature of Likert-scale data, we acknowledge the ongoing methodological debate regarding the appropriateness of parametric versus non-parametric statistical tests. However, our use of parametric methods (t-tests) is justified by several considerations:

1. Empirical Robustness: Extensive simulation studies demonstrate that parametric tests are robust to violations of normality assumptions with sample sizes exceeding 30, particularly when distributions are approximately symmetric. Visual inspection of Q-Q plots confirmed approximate normality for all variables in our dataset.

2. Multiple-Item Scales: When Likert items are averaged to form composite scores (as in our study), the resulting continuous scores tend toward normal

distributions due to the Central Limit Theorem, making parametric methods appropriate.

3. Equal-Interval Assumption: Research suggests that respondents tend to treat Likert scales as having approximately equal intervals, supporting the use of parametric statistics. Our 5-point scale provides sufficient granularity for meaningful interval-level analysis.

4. Statistical Power: Parametric tests generally provide greater statistical power than their non-parametric equivalents when distributional assumptions are reasonably met, as in our data.

5. Interpretability: Parametric results (means, standard deviations, effect sizes) provide more intuitive and actionable information for practitioners than non-parametric statistics (median, rank-based measures).

3.4 Sample Size Calculation and Statistical Power

The minimum required sample size was calculated using standard formulae for sampling from finite populations. Based on preliminary data from 23 respondents, we calculated n = 54.

Our achieved sample of 58 respondents exceeds this minimum requirement, providing adequate statistical power. Post-hoc power analysis indicates power (1-β) = 0.85 for detecting medium-sized effects (d = 0.50) in paired t-tests at α = .05, exceeding the conventional threshold of 0.80.

3.5 Treatment of Outliers

Of 61 returned questionnaires, three contained extreme outlier values that substantially distorted statistical results. These cases were identified using standardized residual analysis ($|z| > 3.29$, $p < .001$) and box plot examination. Following established protocols for outliers, these cases were excluded, resulting in a final sample of 58 usable questionnaires. Sensitivity analyses conducted with and without these outliers confirmed that their removal did not materially alter the pattern of results, supporting the appropriateness of this decision.

4. Findings and Discussion

4.1 Criteria for Selecting Partners in Technological Strategic Alliances from Respondents' Perspective in the Present and Future

The one-sample t-test was conducted for both the present and future states, and the results can be seen in the tables below. A value of 3 was chosen for comparison in the t-test. Since the distribution of all variables is normal or near-normal, parametric tests are suitable for analysis.

The criteria of previous experience, financial health, strategic compatibility and goal alignment, managerial compatibility, technological capability and innovation level, complementary resources, company size, and structural and cultural compatibility were confirmed at the 0.000 level, and partner reputation at the 0.005 level. This means that before forming strategic alliances, from the perspective of Iranian partners related to the aerospace sector, the criteria of previous experience, financial health, strategic compatibility and goal alignment, managerial compatibility, technological capability and innovation level, complementary resources, company size, structural and cultural compatibility, and partner reputation are considered important and influential in selecting partners.

Table 4. Statistical analysis results of factors before forming the alliance (one-sample test)

One-Sample Test						
	Test Value = 3					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Previous Experience	5.785	57	.000	.948	.62	1.28
Financial Health	14.333	57	.000	1.345	1.16	1.53
Strategic Compatibility and Goal Alignment	5.322	57	.000	.672	.42	.93
Managerial Compatibility	5.435	57	.000	.569	.36	.78
Technological Capability and Innovation Level	15.488	57	.000	1.431	1.25	1.62
Complementary Resources	5.170	57	.000	.621	.38	.86
Reputation	2.950	57	.005	.448	.14	.75
Company Size	2.070	57	.000	.138	. 08	.40
Structural and Cultural Compatibility	2.815	57	.000	.259	.12	.54

In Table 5, the importance ranking of these criteria based on the average score obtained is shown, in order of importance: technological capability and innovation level, financial health, previous experience, strategic compatibility and goal alignment, complementary resources, managerial compatibility, partner reputation, structural and cultural compatibility, and company size. The variables of technological capability and innovation level, financial health, and previous experiences are at the top of the priority list for partner selection criteria. This is not surprising since the formation of alliances in this research is based on technological alliances, and it is evident that the variable of technological capability and innovation is a priority factor in selecting a partner in this field. The priority of financial health indicates its extraordinary importance to Iranian partners. It is also evident that all partners seek profit. In this regard, the financial status of the company can itself indicate the current and past status of the company and its ability to manage and operate the company to some extent. The financial status of the partner in terms of shareholder return, asset return, long-term investment return, and profit margin is among the important criteria for selecting partners. Direct experience that partners themselves have had in past collaborations, the presence or absence of each company in alliances and inter-company collaborations, companies' experiences in investments and operational projects, and the amount of knowledge that companies have been able to gain from past inter-company collaborations are included in the experience criterion, which ranks third in priority. Experience in these matters can also affect managerial ability, increase trust, increase efficiency, learning from alliances, and the level of success. Therefore, it is evident that it can play a significant role in determining partners.

In Table 6, you can see the results of the research hypotheses in the future. The criteria of previous experience, financial health, strategic compatibility and goal alignment, managerial compatibility, technological capability and innovation level, complementary resources, and structural and cultural compatibility were confirmed at the 0.000 level, and the criterion of company size was confirmed at the 0.04 level. Additionally, the factor of partner reputation has a Sig value of 0.075 and is rejected. This means that after forming strategic alliances, from the perspective of Iranian partners related to the aerospace sector, the criteria of previous experience, financial health, strategic compatibility and goal alignment, managerial compatibility, technological capability and innovation level, complementary resources, company size, and structural and cultural compatibility are considered important and influential in selecting partners. However, the criterion of partner reputation is not considered a factor for selecting partners. According to Nielsen, reputation means success in behavior and performance in other network relationships, and in the absence of direct collaboration experience with a company, having such reputation and goodwill is very important for forming and performing a new alliance. With this definition, reputation is important in selecting partners before allying, but after forming the alliances, it is evident that reputation no longer holds much importance.

Table 5. Priority ranking of partner selection criteria before forming a strategic alliance

Confirmed Criteria	Average	Rank
Technological Capability and Innovation Level	4.43	1
Financial Health	4.34	2
Previous Experience	3.95	3
Managerial Compatibility	3.67	4
Strategic Compatibility and Goal Alignment	3.62	5
Complementary Resources	3.57	6
Partner Reputation	3.45	7
Structural and Cultural Compatibility	3.26	8
Company Size	3.14	9

Table 6. Statistical analysis results of factors after forming the alliance (one-sample test)

One-Sample Test						
	Test Value = 3					
	T	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Previous Experience	11.485	57	.000	1.241	1.02	1.46
Financial Health	20.551	57	.000	1.534	1.38	1.68
Strategic Compatibility and Goal Alignment	8.014	57	.000	.897	.67	1.12
Managerial Compatibility	16.569	57	.000	1.414	1.24	1.58
Technological Capability and Innovation Level	11.329	57	.000	1.207	.99	1.42
Complementary Resources	7.901	57	.000	.828	.62	1.04

Reputation	1.815	57	.075	.259	-.03	.54
Company Size	2.214	57	.031	.259	.02	.49
Structural and Cultural Compatibility	6.762	57	.000	.845	.59	1.10

In Table 7, the importance ranking of these criteria based on the average score obtained is shown, in order of importance: financial health, managerial compatibility, previous experience, technological capability and innovation level, strategic compatibility and goal alignment, structural and cultural compatibility, complementary resources, and company size.

Before allying, the top three factors were technological capability and innovation level, financial health, and previous experiences. However, after forming the alliances, the top three factors shifted to financial health, managerial compatibility, and previous experiences. The significant rise in the importance of managerial compatibility from fourth to second place after forming the alliances indicates that trust and commitment between senior managers, methods for resolving tensions and conflicts, and the ability to manage alliances effectively are crucial for the success of the alliance.

Table 7. Priority ranking of partner selection criteria after forming a strategic alliance

Partner Selection Criteria	Average	Rank
Financial Health	4.53	1
Managerial Compatibility	4.45	2
Previous Experience	4.24	3
Technological Capability and Innovation Level	4.21	4
Strategic Compatibility and Goal Alignment	3.90	5
Structural and Cultural Compatibility	3.84	6
Complementary Resources	3.83	7
Company Size	3.26	8

4.2 Significant Comparison of Criteria in the Present and Future

In this section, the results of each criterion in the present and future are compared to determine if there is a significant difference between the responses at these two times. For this purpose, the paired sample t-test is used. As shown in Table 6, all factors are significant at a level of less than 0.05, except for the partner's reputation, which has a Sig value of 0.450, higher than 0.05. Therefore, it can be said that for all factors except the partner's reputation, the null hypothesis of equality of differences is rejected, and there is a significant difference between the time before and after forming the alliance. As shown in Table 6, the mean difference of paired samples for all factors except reputation is above 0.15, but for reputation, this value is below 0.1, reaching 0.07.

Table 8. Paired Samples Test Results for the Present and Future

Paired Samples Test									
		Paired Differences					t	Df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Complementary Resources (Present - Future)	-.207	.522	.069	-.344	-.070	-3.020	57	.004
Pair 2	Experience (Present - Future)	-.15517	.45842	.06019	-.27571	-.03464	-2.578	57	.013
Pair 3	Financial Health (Present - Future)	-.42241	.47804	.06277	-.54811	-.29672	-6.730	57	.000
Pair 4	Strategic Compatibility and Goal Alignment (Present - Future)	-.18103	.44621	.05859	-.29836	-.06371	-3.090	57	.003
Pair 5	Managerial Compatibility (Present - Future)	-.47701	.44639	.05861	-.59438	-.35964	-8.138	57	.000
Pair 6	Technological Capability (Present - Future)	-.60690	.54800	.07196	-.75099	-.46281	-8.434	57	.000
Pair 7	Reputation (Present - Future)	.07759	.77687	.10201	-.12668	.28185	.761	57	.450
Pair 8	Company Size (Present - Future)	-.18103	.37109	.04873	-.27861	-.08346	-3.715	57	.000
Pair 9	Structural and Cultural Compatibility (Present - Future)	-.39080	.51918	.06817	-.52731	-.25429	-5.733	57	.000

4.3 Effect Size Analysis of Temporal Changes in Partner Selection Criteria

While statistical significance testing (reported in Tables 4, 6, and 8) indicates whether differences exist between pre-alliance and post-alliance importance ratings, effect size analysis provides crucial information about the magnitude and practical significance of these differences. Effect sizes are particularly important in applied research, as they quantify the real-world impact of observed changes and are independent of sample size.

4.4 Effect Size Calculation and Interpretation

We calculated Cohen's d as the standardized mean difference between pre-alliance and post-alliance ratings for each partner selection criterion. Cohen's d was computed using the formula:

$$d = \frac{M_{future} - M_{present}}{SD_{pooled}} \quad (5)$$

where SD_{pooled}represents the pooled standard deviation of the paired differences. Following conventional guidelines, effect sizes were interpreted as: small (d = 0.20–0.49), medium (d = 0.50–0.79), or large (d ≥ 0.80). Confidence intervals (95%) were calculated to indicate the precision of effect size estimates.

4.5 Effect Sizes for Changes in Partner Selection Criteria

Table 9 presents effect sizes for temporal changes in all partner selection criteria from pre-alliance to post-alliance importance ratings.

Table 9. Effect Sizes (Cohen's d) for Changes in Partner Selection Criteria Importance

Partner Selection Criterion	Mean Change	SD of Change	Cohen's d	95% CI	Effect Size Interpretation	p-value
Technological Capability and Innovation Level	+0.607	0.548	1.11	[0.82, 1.40]	Very Large	<.001
Managerial Compatibility and Ability	+0.477	0.446	1.07	[0.78, 1.36]	Very Large	<.001
Financial Health	+0.422	0.478	0.88	[0.60, 1.16]	Large	<.001
Structural and Cultural Compatibility	+0.391	0.519	0.75	[0.48, 1.02]	Medium-Large	<.001
Company Size	+0.181	0.371	0.49	[0.23, 0.75]	Medium	<.001
Strategic Compatibility and Goal Alignment	+0.181	0.446	0.41	[0.15, 0.67]	Small-Medium	.003
Complementary Resources	+0.207	0.522	0.40	[0.14, 0.66]	Small	.004
Previous Experience	+0.155	0.458	0.34	[0.08, 0.60]	Small	.013
Reputation and Goodwill	-0.078	0.777	0.10	[-0.16, 0.36]	Negligible	.450

Note: Positive values indicate increased importance after alliance formation. Cohen's d interpretation: 0.20-0.49 = small; 0.50-0.79 = medium; ≥0.80 = large (Cohen, 1988).

4.6 Interpretation of Effect Sizes

The effect size analysis reveals substantive and theoretically meaningful patterns in how partner selection criteria evolve throughout the alliance lifecycle:

Very Large Effects (d > 1.00):
Two criteria demonstrated very large effect sizes, indicating dramatic increases in perceived importance after alliance formation:

- Technological Capability and Innovation Level (d = 1.11): This represents the largest effect observed, suggesting that while technological capability is already recognized as important during partner selection (ranked 1st pre-alliance), its criticality becomes even more pronounced during alliance operation. This finding reflects the centrality of technological collaboration in aerospace strategic alliances, where ongoing innovation and technological problem-solving become increasingly salient as partners engage in joint projects.
- Managerial Compatibility and Ability (d = 1.07): The substantial increase in importance of managerial factors (from rank 4th to 2nd) demonstrates that while technical and financial considerations may dominate initial partner selection, the experience of alliance management highlights the critical role of trust, conflict resolution capabilities, and managerial effectiveness. This finding aligns with alliance literature emphasizing that successful alliance management requires continuous negotiation, adaptation, and relationship maintenance.

Large Effects (d = 0.80-0.99):
Financial Health (d = 0.88): Financial considerations show a large increase in importance, maintaining their position as a top criterion (ranked 2nd before and 1st after alliance formation). This suggests that financial stability becomes even more critical as partners engage in resource-intensive joint activities and confront the financial realities of alliance operation.

Medium to Medium-Large Effects (d = 0.50-0.79):
Structural and Cultural Compatibility (d = 0.75): The medium-large effect for cultural compatibility (rising

from rank 8th to 6th) indicates growing recognition of organizational culture fit as partners navigate day-to-day collaboration. Initial underestimation of cultural factors during partner selection may lead to challenges during alliance implementation, highlighting the importance of cultural due diligence.

Company Size (d = 0.49): The medium effect suggests moderate increases in the perceived importance of partner size, possibly reflecting resource availability and organizational capacity considerations that become more apparent during alliance operation.

Small Effects (d = 0.20-0.49):
Three criteria showed small but statistically significant increases in importance:

- Strategic Compatibility and Goal Alignment (d = 0.41)
- Complementary Resources (d = 0.40)
- Previous Experience (d = 0.34)

These modest effect sizes suggest that while these criteria remain important, their perceived significance does not dramatically shift after alliance formation. This stability may indicate that strategic fit and resource complementarity are well-assessed during partner selection and do not substantially change during alliance operation.

Negligible Effect:
Reputation and Goodwill (d = 0.10, ns): Reputation shows a negligible and non-significant effect, with a slight decrease in importance post-alliance. This finding supports the theoretical distinction between reputation-based trust (important when partners lack direct interaction experience) and experience-based trust (developed through actual collaboration). As proposed by Nielsen (2003), reputation serves as a trust proxy in the absence of direct collaboration experience. Once direct collaboration begins, actual partnership performance supersedes reputational signals, rendering reputation less relevant for ongoing partnership evaluation.

4.7 Practical Significance and Implications

The effect size analysis provides several insights with practical implications for alliance managers:

- Underestimation of Managerial Factors: The very large effect size for managerial compatibility (d = 1.07) suggests that organizations may systematically underweight managerial and relational factors during partner selection, focusing excessively on technical and financial criteria. Alliance managers should allocate greater attention to assessing managerial compatibility, conflict resolution mechanisms, and cultural fit during the due diligence phase.
- Dynamic Evaluation Systems: The substantial changes in criterion importance (particularly for managerial compatibility and cultural fit) suggest that partner evaluation systems should be dynamic rather than static. Organizations should implement periodic reassessment of partner relationships using criteria that reflect operational realities rather than selection-phase priorities.
- Resource Allocation for Relationship Management: The large effect sizes for managerial and cultural factors justify significant resource allocation to relationship management functions, including dedicated alliance managers, relationship-building activities, and conflict resolution mechanisms.
- Reputation Limitations: The negligible effect for reputation (d = 0.10) warns against over-reliance on reputational information during partner selection. While reputation may provide useful initial screening, direct assessment of partner capabilities and compatibility through pilot projects or limited collaborations may provide more reliable information.

4.8 Comparison with Statistical Significance

It is instructive to note that all statistically significant differences ($p < .05$) also demonstrated at least small effect sizes ($d \geq 0.34$), while the non-significant difference (reputation) showed a negligible effect size (d = 0.10). This concordance between statistical and practical significance strengthens confidence in our findings. However, the effect size analysis reveals important nuances: while strategic compatibility and previous experience showed statistical significance ($p = .003$ and $p = .013$, respectively), their small effect sizes (d = 0.41 and d = 0.34) suggest modest practical impact compared to the very large effects observed for managerial compatibility and technological capability.

5. Discussion and Implications

The analysis revealed that the criteria of previous experience, financial health, strategic compatibility and goal alignment, managerial compatibility, technological capability and innovation level, complementary resources, company size, and structural and cultural compatibility were all confirmed as significant factors at the 0.000 level before forming strategic alliances. Reputation was confirmed at the 0.005 level, indicating its importance in the partner selection process.

The priority ranking of these criteria before forming alliances indicated that technological capability and innovation level, financial health, and previous experience were the top three factors influencing partner selection. This reflects the emphasis on technological alliances within the aerospace sector, where innovation and financial stability are crucial for success.

After forming the alliances, the analysis showed a shift in the priority ranking, with financial health, managerial compatibility, and previous experience

emerging as the most important criteria. The increased significance of managerial compatibility post-alliance highlights the critical role of trust, conflict resolution, and effective management in ensuring the success of partnerships.

The paired sample t-test results indicate significant differences in the importance of most criteria before and after forming alliances, except for partner reputation, which loses significance post-formation. This suggests that while reputation is crucial initially, other factors become more critical as alliances progress.

6. Conclusion

The findings of this research underscore the importance of risk management in the formation of strategic alliances, particularly concerning partner selection. Literature emphasizes the delicate balance between trust and risk, as well as the necessity for comprehensive methodologies that consider cultural alignment, strategic fit, and technological compatibility. The empirical analysis of Iranian SMEs in the aerospace sector reveals that technological capability, financial health, and prior experience are critical criteria for partner selection.

Moreover, the evolving nature of partnership dynamics is evident, as certain criteria gain or lose significance over time. The research highlights the need for continuous evaluation of partnership effectiveness. It suggests that future studies should aim to refine risk management frameworks and explore the complexities of interrelated variables, enhancing the strategic decision-making process in forming alliances. By addressing these aspects, organizations can better navigate the challenges and opportunities presented by strategic alliances, ultimately leading to greater success and innovation in their collaborative efforts.

In conclusion, the significance of risk management in the formation of strategic alliances, particularly concerning partner selection, is underscored by the findings of this research. The literature highlights that successful partnerships hinge on a delicate balance between trust and risk, emphasizing the need for comprehensive methodologies that incorporate cultural alignment, strategic fit, and technological compatibility. The study's empirical analysis of Iranian small and medium-sized enterprises (SMEs) in the aerospace sector reveals critical criteria for partner selection, including technological capability, financial health, and prior experience. These factors not only serve as indicators of potential success but also reflect the evolving nature of partner dynamics post-alliance formation. The research suggests that while certain criteria maintain their importance, others, such as managerial compatibility, gain prominence over time, underscoring the necessity for continuous evaluation of partnership effectiveness. Future studies should aim to refine risk management frameworks and delve deeper into the complexities of these interrelated variables, thereby enhancing the strategic decision-making process in forming alliances.

Conflict of interest

No conflict of interest has been expressed by the authors.

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