Original Research

Identification of Export Financing Dimensions for Technical and Engineering Services in the Field of Transport Infrastructure under the Buyer's Credit Scheme

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Abstract
Export financing for technical and engineering services in infrastructure projects, particularly in transportation infrastructure, has become a critical area of focus for policy-makers. The buyer's credit scheme is one of the primary financial mechanisms that enhances the global competitiveness of Iranian contractors. However, due to its novelty in Iran and a lack of comprehensive understanding of its dimensions, this scheme has not achieved its full potential, leading to inefficiencies in foreign exchange resource allocation. This study aims to bridge this gap by identifying the key dimensions of export financing for transportation infrastructure projects under the buyer's credit scheme. By employing a mixed-methods approach, this research integrates qualitative insights from expert interviews (analyzed using thematic analysis in MAXQDA) with a quantitative validation process using structural equation modeling (SEM) in Smart PLS. The findings reveal five global themes, eleven organizing themes, and twenty-three key indicators, forming a comprehensive framework for evaluating and optimizing buyer's credit schemes. This research contributes to the field by offering a structured model that enhances the effectiveness of export financing strategies. The findings provide actionable insights for policy-makers and practitioners to refine financial policies, mitigate risks, and strengthen Iran's position in international infrastructure markets.

Keywords - Export Financing; Technical and Engineering Services; Buyer's Credit Scheme; Transportation Infrastructure

INTRODUCTION

Formulating and implementing export policies to support exports, especially the development of non-oil exports, has always been a key focus in Iran's economic development programs. Export support has significant impacts on economic growth diversification of target markets, job creation, and gross domestic product (GDP) (Brooks & Van Biesebroeck, 2017; Janda et al., 2013). Furthermore, by adopting appropriate strategies, governments can create the necessary resources and capacities to enhance their competitiveness in international markets (Kahya, 2024). Among these, the transportation sector, due to its infrastructural nature and high investment requirements, plays a crucial role in export development policies. This is particularly important for countries with large populations and a strong need to improve transportation networks (OECD, 2018). In recent years, the emphasis on diversifying national revenue sources and reducing dependency on oil revenues has led to greater attention toward the development of non-oil exports, particularly in industrial and infrastructural sectors such as transportation. This focus not only fosters domestic economic growth but also creates new export opportunities. According to reports from international organizations, developed and developing countries that have successfully built modern and efficient transportation infrastructure have gained the interest of other nations, particularly neighboring countries, for economic and trade cooperation (International Energy Agency, 2021).

Iranian companies in the transportation infrastructure sector have extensive and successful experience in constructing and launching various projects, including railways, highways, bridges, tunnels, and ports. Additionally, Iran has the capacity to supply essential raw materials for these projects, such as cement, steel, bitumen, and specialized equipment like rails. These capabilities enable Iran to offer technical and engineering services for construction projects in neighboring countries at more competitive costs compared to other nations (Nasirian, 2025). This potential contributes to job creation and an increase in foreign currency revenues for the country. However, large-scale infrastructure projects in the transportation sector require substantial and efficient financing due to their vast scale. Many of these projects demand significant liquidity for execution, which can serve as a barrier to both project development and the export of technical and engineering services. Globally, exporting countries employ various financial tools to support project financing and facilitate their export services. One such tool is the buyer's credit scheme, which allows exporters to extend financial facilities to foreign employers, thereby strengthening their competitiveness in international markets (Picha et al., 2016). Utilizing buyer’s credit as a modern financial instrument in international trade has significantly enhanced nations' competitiveness in global markets.

In Iran, given the country's unique economic and political conditions, utilizing this financing tool can serve as an effective solution to address challenges in funding export projects. Since many countries, especially neighboring ones, have substantial needs for developing transportation infrastructure, Iran, through the adoption of buyer’s credit, can not only expand its export capabilities but also establish strategic partnerships and finance projects at an international level. However, the assessment and management of financial risks in large-scale infrastructure financing—such as currency fluctuations, project delays, changes in raw material prices, and policy uncertainties—can significantly affect the financial feasibility of these projects (Ali et al., 2021). Credit risk, which refers to the failure of borrowers to fulfill their financial obligations, is also one of the main obstacles to project financing, particularly in infrastructure development. Mitigating credit risk plays a crucial role in improving accuracy, reducing costs, and increasing the efficiency of financial risk assessments. This issue is especially critical in granting large-scale loans for infrastructure projects (Abdi, 2021). Moreover, legal complexities, financial risks, and a lack of comprehensive understanding of implementation processes remain major obstacles to the effective utilization of the buyer’s credit scheme. With regard to the fact that no research has been conducted in Iran on the dimensions of the buyer’s credit scheme for the development and export of technical and engineering services in transportation infrastructure, this study aims to fill the theoretical gap by identifying the dimensions of this scheme. Practically, it seeks to enhance policymakers' recognition and contribute to the successful

I. Theoretical Framework

The export of technical and engineering services in Iran, particularly in key infrastructure sectors such as transportation, energy, oil, and gas, holds significant economic and strategic importance. As a core strategy for developing non-oil exports, the export of technical and engineering services encompasses a wide range of activities, including design, project management, procurement, and execution of large-scale projects by Iranian firms for foreign clients (Ebrahimi et al., 2021). According to the Executive Regulations for Supporting the Export of Technical and Engineering Services (2001), these services span multiple industries, including facilities and equipment, energy, oil, gas, petrochemicals, power, water and electricity, construction,

transport infrastructure, mining, agriculture, and information technology, all aimed at enhancing non-oil export volumes and expanding Iran's presence in international markets. Large-scale infrastructure projects, particularly in the transportation sector, require substantial financial investment. These projects frequently face funding shortages, and securing adequate financial resources is a key determinant of successful project execution. In this context, export financing instruments, such as pre-shipment financing, post-shipment financing, and buyer's credit, play a crucial role in facilitating and accelerating project implementation (Sichuk & Heretsiyuk, 2021). These financial tools enable exporters to secure the necessary capital through banking facilities and export credit agencies, ensuring a steady flow of resources to sustain project timelines and operational efficiency.

In post-shipment financing, various financial instruments, including seller's credit, buyer's credit, investment financing, and export document discounting, are widely utilized. These mechanisms offer significant advantages to exporters, granting them access to international financial markets while simultaneously mitigating commercial and political risks (Gharshasbi & Rahnamoon, 2020). Additionally, the issuance of insurance policies and guarantees serves as a protective measure against political and commercial uncertainties, shielding exporters from potential risks such as currency fluctuations, economic crises, and sovereign defaults (WTO, 2016). Globally, governments and financial institutions employ a variety of financial instruments, including buyer's credit, seller's credit, and export insurance policies, to streamline export operations and facilitate infrastructure project financing. These mechanisms enable exporters to minimize financial risks, enhance contractual security, and simplify international trade procedures (kenton, 2021). Particularly for large-scale infrastructure projects requiring extensive capital investment, export financing serves as a critical driver of competitive advantage, reinforcing a country's position in global markets and fostering long-term economic partnerships.

RESEARCH BACKGROUND

A comprehensive review of the literature indicates that no prior study has explicitly investigated the financing of export transportation infrastructure through a buyer's credit scheme. While various studies have independently explored export financing, transportation infrastructure development, and buyer's credit mechanisms, an integrated analysis combining these aspects remains absent in the existing body of research. This research gap underscores the necessity of establishing a structured analytical framework that interconnects these components, offering a more comprehensive perspective on financing solutions within the transportation sector. Tables 1 and 2 categorize relevant studies into domestic and international contexts, delineating their contributions to export financing strategies, infrastructure development, and related financial mechanisms.

TABLE 1
RESEARCH BACKGROUND (INTERNATIONAL STUDIES)

Researchers / Year	Research Title	Research Subject	Results and Findings
Kim, S. M. (2019)	Guide to Business Financing Mechanisms in International Transactions	Introducing buyer credit facilities in project financing abroad	Examining the stages of the buyer credit process, including contract execution, guarantees, insurance policies, and their advantages and disadvantages in infrastructure projects
Picha, J., et al. (2016)	Success Factors in Export Financing Using the Buyer Credit Scheme	Analysis of buyer credit as one of the best methods for financing the export of technical and engineering services	Identifying factors affecting buyer credit and providing a roadmap for users of this scheme in large-scale and infrastructure projects
Jo, Hee-Young & Lee, Dong-Jan (2021)	International Payments, Including Buyer Credit: A Classification Model	Analysis of international payments, including buyer credit, and creating a classification model	Developing a classification model for buyer credit, identifying risks in export financing, and proposing solutions to mitigate commercial and political risks
Picha, J., et al. (2014)	Export Financing in International Construction	Analysis of export financing strategies in international construction	Export credit agencies and financial institutions play a key role in mitigating financial risks and supporting infrastructure projects

Table 1 summarizes key international studies on buyer's credit schemes and export financing, highlighting critical aspects such as project financing, risk management, and strategic frameworks. These studies examine success factors, classification models,

and risk mitigation strategies, offering insights into the effectiveness of buyer's credit in large-scale infrastructure projects. The research underscores the role of export credit agencies and financial institutions in reducing financial risks and supporting international trade. Additionally, some studies provide frameworks for optimizing payment mechanisms and enhancing policy effectiveness. This comparative analysis helps clarify best practices in export financing, offering valuable insights for improving global trade and project financing strategies.

TABLE 2
RESEARCH BACKGROUND (DOMESTIC STUDIES)

Researchers / Year	Research Title	Research Subject	Results and Findings
Ebrahimi, M., et al. (2021)	Examination and Analysis of Regulations and Laws on Exporting Technical and Engineering Services in Iran	Analysis of regulations and policies supporting the export of technical and engineering services in Iran	Explaining the regulations and supportive laws for the export of technical and engineering services, especially in transportation infrastructure and other economic development sectors
Adabi, A. & Gerashasbi, S. (2022)	Vulnerability Analysis of Non-Oil Export Financing	Analysis of challenges and vulnerabilities in the financing of non-oil exports, especially in technical and engineering services	Identifying existing issues in the financing of non-oil exports and providing solutions for improving the financing processes of large-scale and infrastructure projects
Yazdani, M. (2016)	The Determinants of Export of Technical and Engineering Services in Iran: Seasonal Co-integration Approach	Analysis of key determinants influencing Iran's technical and engineering services exports.	Government support policies, GDP, inflation, real exchange rate, and liquidity significantly impact the export of technical and engineering services in Iran.
Tayebi, K., et al. (2014)	The Impact of Innovation on the Development of Technical and Engineering Services Exports in Selected Emerging Markets	Examining the impact of innovation on the development of technical and engineering services exports in emerging markets.	Innovation positively influences exports, with GDP, exchange rates, and R&D investments playing key roles in export growth.

Table 2 summarizes domestic studies related to export financing, regulatory frameworks, and factors influencing the development of technical and engineering services in Iran. The listed studies examine legal frameworks, policy support, financial challenges, and the role of innovation in export expansion. While some studies focus on financing mechanisms and risk management in large-scale infrastructure projects, others highlight the impact of government policies, economic indicators, and innovation on export performance. These studies provide insights into the regulatory landscape governing export activities and offer recommendations for improving export financing strategies and fostering innovation to enhance the competitiveness of technical and engineering service exports.

A review of the research background indicates that while numerous studies have explored export financing methods, financial risk assessment, and transportation infrastructure development, no prior research has comprehensively examined the dimensions of the buyer's credit scheme in financing the export of technical and engineering services within transportation infrastructure. From a theoretical standpoint, this study addresses this research gap by employing a mixed-methods approach to systematically identify, categorize, and analyze the key components of this financial mechanism. Unlike previous studies that have primarily focused on general export financing strategies, this research provides a targeted analysis of the buyer's credit scheme, emphasizing its application in transportation infrastructure a sector that demands substantial investment and long-term financial planning. Additionally, by considering Iran's distinct economic and political landscape, this study investigates the practical challenges associated with implementing this scheme and presents a comprehensive evaluation of the barriers and opportunities it entails. From a practical perspective, the findings of this research offer policymakers, financial institutions, and exporters' deeper insights into the operational feasibility and strategic implications of the buyer's credit scheme. Moreover, this study lays the groundwork for future research aimed at refining and optimizing this financing mechanism to enhance the international competitiveness of Iran's technical and engineering service exports in the transportation sector.

RESEARCH PROBLEM AND METHODOLOGY

In recent years, the development of non-oil exports, particularly in the field of technical and engineering services, has garnered significant attention in Iran's economic programs as a key strategy to strengthen the national economy and reduce dependency on oil revenues. In this regard, Iran, with its advanced technical expertise and extensive experience in various infrastructure sectors, particularly transportation, can play a significant role in global markets. Large-scale infrastructure projects in this domain, such as the construction of railways, highways, metros, ports, and airports, not only offer considerable advantages in

terms of employment and economic development but also require substantial financing. Due to the large scale of investments and inherent risks, ensuring the financial resources needed for the execution of these projects is of paramount importance. Among the available financial tools, the buyer's credit scheme stands out as an efficient mechanism for financing the export of technical and engineering services, especially for large-scale and infrastructure projects. By providing financial facilities from the exporting country to foreign employers, this scheme not only facilitates project implementation but also reduces political and commercial risks (Picha et al., 2016). However, challenges such as legal complexities, financial risks, unfamiliarity with the operational processes of this scheme, and Iran's specific political and economic conditions, including economic sanctions, have hindered its effective use. In some cases, issues such as non-repayment of funds and the waste of foreign exchange resources have been observed. Given the importance of this topic and Iran's significant potential in exporting technical and engineering services, particularly in transportation infrastructure, this research seeks to identify the various dimensions of financing the export of technical and engineering services through the buyer's credit scheme. It aims to analyze the factors that could improve the financing process and facilitate the use of this tool in the international arena. Additionally, considering Iran's unique political and economic context, the study will examine the barriers and challenges to employing this tool in infrastructure projects and propose effective solutions for its optimal utilization. Ultimately, this research intends to draw upon existing experiences and available information to provide a practical roadmap for maximizing the benefits of the buyer's credit scheme in financing the export of technical and engineering services in the transportation infrastructure sector.

I. Research Question

This study aims to address the following research question:

What are the dimensions, components, and indicators of financing the export of technical and engineering services in the transportation infrastructure sector under the buyer's credit scheme?

II. Research Methodology

This study was conducted using a mixed-methods approach, incorporating both qualitative and quantitative phases.

- Qualitative Phase

In the qualitative phase, after an extensive review of the existing literature, the researcher conducted in-depth interviews with 11 experts in export financing. The sampling process was purposeful, utilizing a snowball sampling technique, and interviews continued until theoretical saturation was reached. Semi-structured interviews were used to collect data. The data analysis followed a three-tier coding process using MAXQDA software:

A. Initial Coding: Extracting basic themes (indicators).

B. Grouping: Categorizing basic themes into organizing themes (components).

C. Axial Coding: Identifying global themes (dimensions).

The results of this process led to the creation of a thematic network (model) that comprehensively represents the indicators (basic themes), components (organizing themes), and dimensions (global themes) of financing the export of technical and engineering services in the transportation infrastructure sector through the buyer's credit scheme.

- Quantitative Phase

In the quantitative phase, to validate the extracted model, the indicators (observable variables) were tested through a questionnaire, gathering insights from experts in export financing and the buyer's credit scheme. This analysis was conducted using structural equation modeling (SEM) in Smart PLS software, including factor load analysis and model fitness evaluation.

- Validity and Reliability Assessments

A. Qualitative Phase:

- The face and content validity of the research tools were evaluated through expert feedback from banking professionals and export financing specialists.

- The reliability of the coding process was assessed using Cohen’s kappa coefficient, demonstrating adequate reliability (κ = 81%).

- Data validation was ensured through member-checking with research team members and interview participants. To achieve theoretical saturation, data collection and analysis continued until no new information emerged.

B. Quantitative Phase:

- The validity and reliability of the questionnaire were assessed using Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE).

- The model fit was confirmed based on these analyses.

This mixed-methods approach ensured a comprehensive exploration and validation of the dimensions, components, and indicators of financing export services in the transportation infrastructure sector using the buyer's credit scheme.

RESEARCH FINDINGS

I. Qualitative Phase

After examining the demographic characteristics of the research participants, a thematic analysis method was employed for data coding. The collected interviews were analyzed and segmented into meaningful units, leading to the identification of 23 initial themes. These themes were further categorized into 11 organizing themes and 5 overarching themes, providing a structured framework for understanding the dimensions of financing technical and engineering service exports in transportation infrastructure through buyer credit schemes. Table 3 presents the extracted themes, illustrating key factors influencing financing decisions, project evaluations, risk assessments, and the impact of international political and economic conditions. This categorization helps in systematically organizing the qualitative findings and highlights the core areas affecting the efficiency of buyer's credit schemes in export financing.

TABLE 3
EXTRACTED THEMES FOR FINANCING TECHNICAL AND ENGINEERING SERVICE EXPORTS IN TRANSPORTATION INFRASTRUCTURE THROUGH BUYER CREDIT SCHEMES

Overarching Themes	Organizing Themes	Primary Themes	Q
Government Decisions	Government's Objectives for Export Financing of Technical and Engineering Services in Transportation Infrastructure	Economic Objectives of Export Financing	Q1
		Political and Strategic Objectives of Export Financing	Q2
	Political and Economic Decisions of Government	Permits and Supervision of the Contractor's Country	Q3
		Joint Financing of Projects with Other Countries	Q4
Evaluation of Transportation Infrastructure Projects	Evaluation of Iranian Contractor	Contractor's Reputation and Commitment	Q5
		Financial and Technical Capacity of the Contractor	Q6
	Evaluation of the Project at the Approval Stage	Market Knowledge of the Project Location	Q7
		Technical and Financial Justifiability of the Project	Q8
	Buyer Evaluation	Possibility of Obtaining Government, Insurance, and Bank Guarantees from the Employer's Country	Q9
		Credit Rating and Political, Economic, Legal Stability in the Employer's Country	Q10
		Reputation of the Foreign Employer	Q11
Implementation of Transportation Infrastructure Projects	Domestic Regulations and Collaterals	Compliance with Domestic Regulations	Q12
		Obtaining Guarantees from Domestic Resources	Q13
	Risks and Costs	Provision of Raw Materials for Project Execution	Q14
		Operation of the Project and Repayment of Funds	Q15
Supervision of Transportation Infrastructure Projects	Implementation in the Lending Buyer's Credit Evaluation Bank	Adherence to Technical and Legal Principles in the Lending Bank	Q16
		Supervision and Risk Assessment by the Lending Bank	Q17
	Supervision of Project Implementation Abroad	Supervision by the Foreign Employer	Q18
		Supervision by the Government or Bank of the Foreign Employer	Q19
International Political and Economic Conditions	Political and Economic Fluctuations Worldwide	Economic and Currency Fluctuations Worldwide	Q20
		Political Fluctuations, Wars, and Turmoil Worldwide	Q21
	Economic Sanctions	Status of Brokerage Relations in Sanctioned Conditions	Q22
		Status of International Rights and Privileges in Sanctioned Conditions	Q23

The categorization in Table 3 highlights the critical aspects influencing the success of buyer's credit schemes in financing transportation infrastructure exports. The findings indicate that government policies, project evaluation criteria, financial risks,

and international economic conditions are crucial determinants in ensuring the effectiveness of such financial mechanisms. Understanding these factors enables policymakers, financial institutions, and exporters to address challenges proactively and enhance the strategic application of buyer's credit in infrastructure projects. By systematically analyzing these elements, the study provides valuable insights into optimizing financing solutions for technical and engineering service exports.

II. Quantitative Phase

To evaluate the extracted themes using statistical tests, a sample size of approximately 293 respondents was determined for the target population of 1,200 individuals using Cochran's formula, ensuring a 95% confidence level and a 5% margin of error. The significance of the 23 extracted indicators was assessed by distributing a structured questionnaire among 293 experts in export financing. The collected data underwent rigorous statistical analysis to validate the findings and ensure their reliability.

III. KMO and Bartlett's Test

To assess the adequacy of the sample for factor analysis, the Kaiser-Meyer-Olkin (KMO) test and Bartlett's test of sphericity were conducted using SPSS software. The KMO measure indicated a high level of sampling adequacy, confirming that the data were suitable for factor analysis. Additionally, Bartlett's test demonstrated statistical significance, further validating the dataset's appropriateness for dimensionality reduction and structure identification.

TABLE 4
KMO AND BARTLETT'S TEST

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.882
Bartlett's Test of Sphericity	Approx. Chi-Square	2553.800
	df	253
	Sig.	.000

TABLE 5
COMMUNALITIES OUTPUT

	Initial	Extraction
Q1	1.000	.265
Q2	1.000	.593
Q3	1.000	.506
Q4	1.000	.653
Q5	1.000	.639
Q6	1.000	.542
Q7	1.000	.468
Q8	1.000	.421
Q9	1.000	.596
Q10	1.000	.487
Q11	1.000	.555
Q12	1.000	.574
Q13	1.000	.499
Q14	1.000	.528
Q15	1.000	.555
Q16	1.000	.589
Q17	1.000	.397
Q18	1.000	.604
Q19	1.000	.419
Q20	1.000	.444
Q21	1.000	.613
Q22	1.000	.662
Q23	1.000	.465

Extraction Method: Principal Component Analysis.

*IV. **Communalities Output***

The communalities output revealed that a significant portion of variance for most variables was explained by the extracted factors. Specifically, variables Q4, Q5, and Q9 exhibited high correlations with the identified factors, indicating their substantial contribution to the underlying structure of financing technical and engineering service exports. Conversely, variables Q1 and Q8 showed weaker correlations, suggesting that while they play a role in the financing model, their influence is comparatively lower than other variables. This analysis underscores the varying degrees of importance and contribution of the extracted indicators, offering valuable insights into the key determinants of financing mechanisms in transportation infrastructure projects. Understanding these factor structures provides policymakers and financial institutions with a clearer foundation for optimizing funding strategies and mitigating risks associated with export financing.

*V. **Factor Loadings Analysis in Smart PLS***

To examine the relationships between the research variables, a factor loadings analysis was conducted using Smart PLS. This model illustrates the latent variables (key research constructs) and their corresponding observed indicators (survey questions). Factor loadings represent the correlation strength between indicators and their respective latent variables. A higher factor loading signifies a stronger contribution of an indicator to the construct it measures. The following diagram presents the measurement model and the analysis of factor loadings in Smart PLS revealed the following insights (Figuri1):

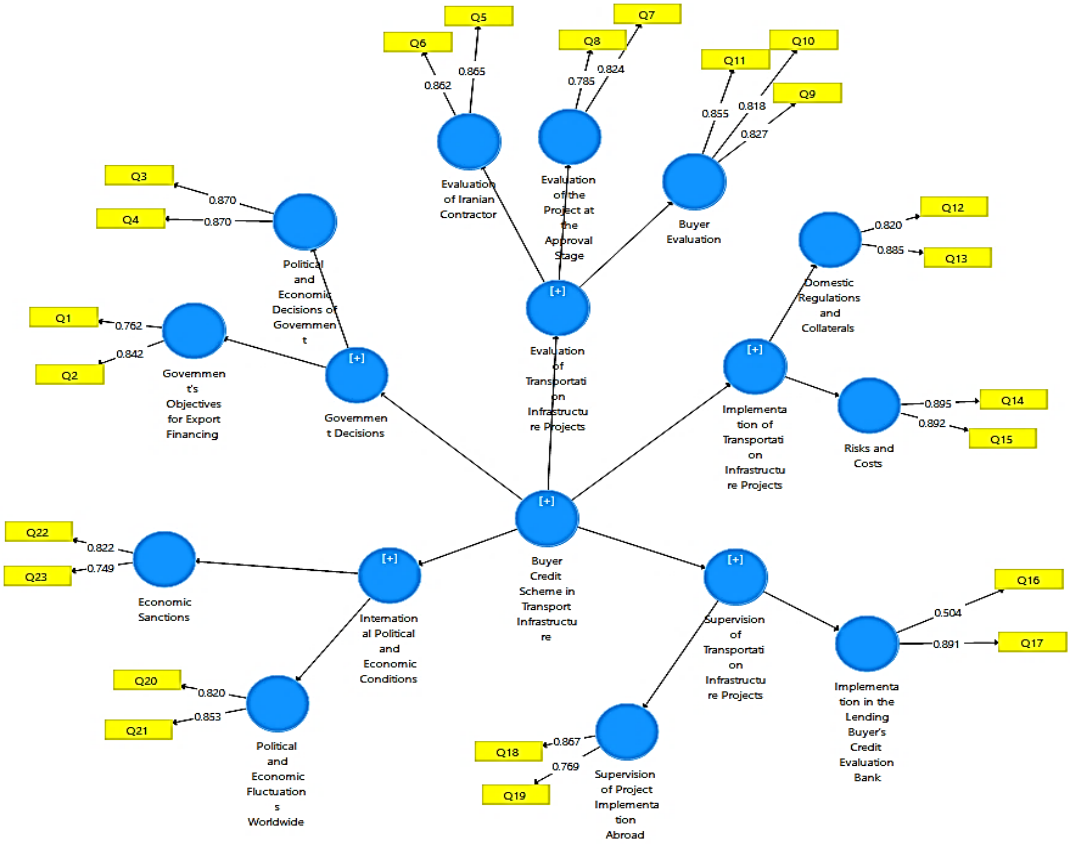

FIGURE 1
FACTOR LOADING ANALYSIS

VI. Reliability and Validity Tests in Smart PLS

The analysis of factor loadings in Smart PLS provides critical insights into the validity and reliability of the measurement model. Most indicators exhibit factor loadings above 0.7, indicating a strong relationship with their respective latent variables. Items with factor loadings between 0.5 and 0.7 are considered acceptable, demonstrating that the extracted indicators sufficiently explain the constructs. These results confirm the robustness of the model, ensuring that the observed variables effectively measure their intended latent constructs. The strong factor loadings validate the theoretical framework and enhance confidence in the study's findings, reinforcing the reliability of the measurement structure for further statistical analysis.

VII. Reliability and Validity Tests in Smart PLS

To ensure the robustness of the measurement model, reliability and validity tests were conducted using Smart PLS. These tests assess the internal consistency, reliability, and convergent validity of the constructs, ensuring that the observed variables effectively measure their corresponding latent constructs.

A. Convergent Validity (AVE)

- Average Variance Extracted (AVE) was calculated to assess convergent validity, determining the extent to which a construct explains the variance of its indicators.
- An AVE value of 0.5 or higher indicates that the construct captures at least 50% of the variance of its associated indicators, confirming sufficient convergent validity.
- Constructs meeting this criterion demonstrate that their indicators are well-correlated and effectively represent the underlying concept.

B. Composite Reliability (CR)

- Composite Reliability (CR) evaluates the internal consistency and reliability of indicators within a construct, offering a more comprehensive measure compared to Cronbach's alpha.
- A CR value of 0.7 or higher is considered acceptable, indicating a high level of internal consistency.
- This measure incorporates factor loadings, measurement errors, regression coefficients, and correlations to ensure a holistic assessment of construct reliability.

C. Cronbach's Alpha (α)

- Cronbach's alpha assesses the degree of correlation among items within a construct, measuring their internal consistency.
- A threshold of 0.7 or higher is generally accepted as an indicator of acceptable reliability.
- While widely used, Cronbach's alpha is complemented by CR to provide a more robust verification of reliability.

The results of these tests are presented in Table 6, summarizing the values of Cronbach's Alpha, Composite Reliability (CR), and Average Variance Extracted (AVE) for each construct.

TABLE 6
CRONBACH'S ALPHA, COMPOSITE RELIABILITY, AVERAGE VARIANCE EXTRACTED (AVE) TEST

Validity and Reliability Tests for Constructs	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Execution at the Lending Bank	0.762	0.855	0.747
Buyer Evaluation	0.705	0.71	0.555
Evaluation of the Project at Approval	0.789	0.905	0.826
Evaluation of the Iranian Contractor	0.759	0.757	0.609
Economic Sanctions	0.731	0.799	0.567
Political and Economic Decisions of the Government	0.792	0.905	0.827
Risks and Costs	0.772	0.897	0.813
Domestic Regulations and Collateral	0.746	0.811	0.683
Supervision of Project Execution Abroad	0.792	0.904	0.825
Political and Economic Fluctuations Worldwide	0.792	0.906	0.827
Government's Objectives for Export Financing	0.78	0.862	0.757

The results confirm that all constructs meet the reliability and validity criteria, ensuring a strong and reliable measurement model. The Cronbach's alpha values for all constructs exceed 0.7, demonstrating acceptable internal consistency. Similarly, the composite reliability values (CR) are above 0.7, reinforcing the constructs' reliability. Furthermore, the AVE values exceed 0.5, confirming sufficient convergent validity. These findings indicate that the model effectively captures the relationships among variables, validating the robustness of the theoretical framework. Ensuring high reliability and validity enhances the credibility of the results and supports the accuracy of the proposed structural model for further hypothesis testing and statistical analysis.

VIII. D.Fornell and Larcker Test:

The Fornell and Larcker test is used to assess discriminant validity, ensuring that each construct in the model is distinct and not highly correlated with others. This test is crucial in verifying that variables measure unique concepts rather than overlapping significantly. In this test, the square root of the Average Variance Extracted (AVE) for each construct, represented by the diagonal values in Table 7, must be higher than the corresponding off-diagonal values. This criterion confirms that each construct shares greater variance with its own indicators than with other constructs, thereby demonstrating discriminant validity.

TABLE 7
FORNELL AND LARCKER TEST

Construct / Variable	Government's Objectives for Export Financing	Political and Economic Decisions of the Government	Risks and Costs	Domestic Regulations and Collateral	Evaluation of the Iranian Contractor	Execution at the Lending Bank	Evaluation of the Project at Approval	Political and Economic Fluctuations Worldwide	Economic Sanctions	Buyer Evaluation	Supervision of Project Execution Abroad
Government's Objectives for Export Financing	0.87										
Political and Economic Decisions of the Government	0.725	0.909									
Risks and Costs	0.2	0.204	0.902								
Domestic Regulations and Collateral	0.301	0.308	0.726	0.827							
Evaluation of the Iranian Contractor	0.223	0.251	0.548	0.606	0.781						
Execution at the Lending Bank	0.147	0.093	0.253	0.27	0.479	0.864					
Evaluation of the Project at Approval	0.081	0.058	0.138	0.168	0.311	0.672	0.909				
Political and Economic Fluctuations Worldwide	0.289	0.243	0.382	0.431	0.473	0.307	0.229	0.91			
Economic Sanctions	0.218	0.211	0.488	0.447	0.531	0.326	0.237	0.564	0.753		
Buyer Evaluation	0.26	0.151	0.458	0.535	0.524	0.231	0.146	0.456	0.442	0.745	
Supervision of Project Execution Abroad	0.728	1	0.208	0.313	0.253	0.093	0.058	0.245	0.212	0.152	0.908

In Table 7, the diagonal values represent the square root of the AVE for each construct, while the off-diagonal values indicate the correlations between constructs. Since the diagonal values exceed the off-diagonal ones, the results confirm that discriminant validity is established according to the Fornell and Larcker criterion These findings reinforce the robustness of the measurement model, ensuring that each construct uniquely contributes to the overall framework. Establishing discriminant

validity strengthens the reliability of subsequent hypothesis testing and structural equation modeling, confirming that the variables measure distinct theoretical constructs rather than redundant or overlapping concepts.

IX. Evaluation of Structural Model Quality

A. R Square Test

The R Square test assesses the predictive accuracy of dependent variables in the structural model. It determines how much of the variance in endogenous variables is explained by exogenous variables, providing insight into the model's explanatory power. The acceptable values for this test are categorized into three levels:

- 0.19 indicates weak predictive power.
- 0.33 indicates moderate predictive power.
- 0.67 indicates strong predictive power.

These benchmarks help interpret the model's effectiveness in predicting the behavior of endogenous variables.

TABLE 8
R SQUARE TEST

Variable	R Square	R Square Adjusted
Government's Objective in Export Financing	0.695	0.695
Political and Economic Decisions of the Government	0.678	0.677
Risks and Costs	0.353	0.351
Domestic Regulations and Collaterals	0.427	0.426
Evaluation of Iranian Contractor	0.607	0.606
Implementation in the Credit Granting Bank	0.685	0.684
Evaluation of the Project at Approval Time	0.545	0.544
Political and Economic Fluctuations Worldwide	0.723	0.722
Economic Sanctions	0.567	0.566
Buyer Evaluation	0.323	0.321
Monitoring the Implementation of the Project Abroad	0.55	0.55

Table 8 presents the R Square values for the key constructs in the study. Higher R Square values suggest a greater proportion of variance explained by independent variables, strengthening the model's predictive accuracy. For instance, Political and Economic Fluctuations Worldwide (0.723) and Government's Objective in Export Financing (0.695) exhibit strong predictive power, indicating that the independent variables significantly explain their variance. On the other hand, Buyer Evaluation (0.323) falls into the moderate range, suggesting that additional influencing factors may exist beyond the model's scope. These findings confirm that most constructs demonstrate moderate to strong predictive accuracy, reinforcing the model's reliability for further hypothesis testing and validation

B. Model Fit Test (SRMR)

To assess the overall quality of the structural model, the Standardized Root Mean Square Residual (SRMR) test was conducted. This test, introduced by Ringle, is considered a key measure for evaluating model fit. SRMR indicates the degree of deviation between the structural model and observed data, with an acceptable threshold of less than 0.08. Table 9 reports the SRMR values for both the Saturated Model and Estimated Model, both of which are 0.01, well below the acceptable limit. These results confirm that the structural model exhibits an excellent fit, demonstrating minimal deviation from the observed data and ensuring the robustness of the proposed framework. Overall, the findings indicate that the model provides strong explanatory power and excellent fit, validating its effectiveness in predicting relationships among variables and supporting its application in further statistical analysis.

TABLE 9
FIT TEST

Model	SRMR
Saturated Model	0.01
Estimated Model	0.01

CONCLUSION

Technical and engineering services in the field of transport infrastructure represent one of Iran's most significant export sectors. In addition to generating foreign exchange revenues, they contribute to the development of a knowledge-based economy and strengthen the international position of Iranian companies. However, financing challenges remain a major obstacle to the expansion of this sector. Utilizing the Buyer's Credit Financing Scheme as an effective financial instrument can enhance the competitiveness of Iranian exporters in global markets. Nevertheless, due to the relative novelty of this scheme in Iran and the lack of a comprehensive understanding of its dimensions, its implementation has faced challenges that, in some cases, have led to inefficiencies in the allocation of foreign exchange resources. Therefore, this study aimed to identify the key dimensions and components influencing the financing of technical and engineering service exports in the transport infrastructure sector. The findings of this study indicate that export financing in this field is influenced by 5 main dimensions, which include 11 key components and 23 specific indicators:

1. Political and Economic Decisions of the Government: Including economic and strategic objectives for export financing, government support policies, and joint financing of projects with other countries.
2. Evaluation of Transport Infrastructure Projects: Covering the credit assessment of Iranian contractors, technical and financial feasibility of projects, and knowledge of the target market.
3. Evaluation of the Buyer and Destination Country: Encompassing credit ratings of the destination country, economic and legal stability, the possibility of obtaining bank and insurance guarantees, and the reputation of the foreign employer.
4. Risk and Cost Management: Addressing the supply of raw materials, operational costs, repayment of financial resources, and compliance with domestic regulations.
5. International Economic and Political Conditions: Including global economic and currency fluctuations, the impact of economic sanctions, and international political and legal changes.

The quantitative analysis of this study, conducted using Structural Equation Modeling (SEM), confirmed that key variables such as government decisions, financial risk management, and buyer evaluation play a significant role in the success of this financing scheme. The R-Square values for the key variables ranged between 0.32 and 0.72, demonstrating a strong predictive accuracy and a significant relationship between the examined variables. Therefore, the findings of this study can assist policymakers, financial institutions, and exporters in enhancing the efficiency of the Buyer's Credit Scheme and overcoming its implementation barriers. Furthermore, the results provide a foundation for future research on optimizing export financing methods, analyzing financial risks, and comparing international financing policies.

FUTURE RESEARCH DIRECTIONS

Based on the findings of this study, future research should focus on financing transportation infrastructure through the buyer's credit scheme. Key areas for further investigation include:

- Innovative financing models for transportation infrastructure projects: Exploring hybrid financing methods such as Public-Private Partnerships (PPP) and their role in enhancing the efficiency of the buyer's credit scheme.
- Financial risk analysis in transportation infrastructure financing: Assessing key financial risks, including exchange rate fluctuations, loan repayment defaults, and legal challenges associated with the buyer's credit scheme.
- Comparative studies on transportation infrastructure financing across different countries: Examining international best practices in using buyer's credit for transportation infrastructure development and extracting lessons learned from successful case studies.
- The role of financial institutions and banks in improving the buyer's credit scheme: Investigating credit policies, loan guarantee mechanisms, and risk mitigation strategies adopted by financial institutions to support infrastructure financing.
- The impact of macroeconomic policies on transportation infrastructure financing: Analyzing how sanctions, government fiscal policies, and changes in international regulations affect the successful implementation of the buyer's credit scheme.

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