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Strategic Analysis of Khorramshahr Port Container Terminal Operations Using an Integrated SWOT–AHP Approach

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ABSTRACT

Over 90% of global trade is carried by maritime transport, chiefly via containerisation, so container-terminal efficiency determines a port's competitive advantage. Khorramshahr Port, bordering Iraq and Kuwait on Iran's southern transit route, has high strategic potential but lags leading ports in container infrastructure and equipment. This research analyses container terminal operations at the port and prioritises development strategies by integrating the SWOT matrix with the Analytic Hierarchy Process (AHP). The study is descriptive-analytical and applied. The population comprised expert personnel from the Ports and Maritime Organization, active shipping companies, and loading/unloading operators in Khorramshahr (50 individuals); using Cochran's formula, a sample of 20 experts was selected. Data were collected through semi-structured interviews, field observation, and pairwise-comparison questionnaires, and the IFE, EFE, Internal–External (IE), SWOT, and QSPM matrices were developed. The final IFE score was 2.364 and the EFE score 2.384, placing the terminal in the fifth cell of the nine-cell IE matrix (a conservative position). The leading strengths were discounted tariffs and operational safety; the leading weaknesses were equipment obsolescence and the absence of a dedicated container berth. Regional security and geostrategic location were the main opportunities, and international shipping sanctions the most critical threat. QSPM analysis ranked "private sector participation" first among four WO strategies, with the highest attractiveness score. Given the terminal's conservative-cell position, WO strategies — equipment modernisation, R&D development, penetration of the Iraqi transit market, and attracting private investment — are recommended to strengthen its competitive position.

1. Introduction

The maritime transport industry is the backbone of global trade: more than 90% of the movement of goods between countries takes place by sea, and a substantial share of this volume is moved using container technology. The containerisation of maritime transport in the second half of the twentieth century reduced the cost and time of moving goods to an unprecedented degree and turned container terminals into the critical link connecting maritime and inland supply chains. In this context, the operational efficiency of a container terminal — from the speed of loading and unloading to yard capacity and the quality of hinterland services — has become a strategic competitive advantage for its home port and national economy. Ports that have invested in modernising equipment, automating processes, and engaging the private sector have captured a growing share of the transit and regional trade market, while ports with ageing infrastructure and centralised state management have gradually fallen behind in the competitive race.

Khorramshahr Port, at the south-western tip of Khuzestan province beside the Arvand River, has long been known as Iran's commercial gateway to Iraq and as a route of access to the open waters of the Persian Gulf. Its proximity to Iraq and Kuwait, its location within the Arvand Free Trade Zone, and its closeness to the industrial hubs of Abadan and Ahvaz give it high potential to serve as a regional logistics hub. However, after years of rebuilding infrastructure damaged during the Iran–Iraq war, the port's container terminal still lacks a dedicated berth, modern gantry cranes, and an integrated yard management system — shortcomings that reduce the speed and precision of loading and unloading relative to competing regional ports, including Iraq's Umm Qasr Port. This gap between geostrategic potential and current operational efficiency defines the central problem of this research: what combination of strengths, weaknesses, opportunities, and threats does Khorramshahr Port's container terminal face, and, given their relative priority, which strategies should be placed on the agenda of port managers and policymakers to enhance the terminal's competitive position?

The importance of addressing this question can be justified from both a scientific and a practical standpoint. Scientifically, most previous studies of Iranian container terminals have either confined themselves to technical-efficiency analysis using quantitative methods such as data envelopment analysis, or have presented SWOT analysis qualitatively and descriptively, without systematic factor weighting — an approach that, for lack of quantitative prioritisation, offers limited operational guidance for allocating scarce management resources. Integrating the SWOT matrix with the Analytic Hierarchy Process (AHP) fills this gap by replacing traditional Friedman-type ranking with hourly pairwise comparisons, enabling the calculation of each factor's relative and final weight and, subsequently, the quantitative prioritisation of alternative strategies through the Quantitative Strategic Planning Matrix (QSPM). Practically, the findings can inform decision-making by the Ports and Maritime Organization, shipping companies, and private investors interested in participating in the development of the Khorramshahr container terminal.

Historically, Khorramshahr Port is one of the oldest commercial ports on Iran's northern Persian Gulf coast, with commercial activity dating back to before the establishment of Shahpour (Imam Khomeini) Port. Before the eight-year Iran–Iraq war, it was one of the country's busiest commercial ports, but the war caused extensive damage to its berths, warehouses, and equipment. Reconstruction began in the 1990s, and in recent years, with part of the basic infrastructure completed, the development of a standard container terminal on roughly 30 hectares of land has been placed on the Ports and Maritime Organization's agenda. However, the absence of a codified vision and mission for the existing container terminal — in contrast to the terminal under construction, which targets an operational capacity of five million TEU per year — indicates that strategic planning for this terminal remains at an early stage, and the present research aims to contribute to developing this strategic framework.

Conceptually, the SWOT matrix, one of the most widely used strategic-planning tools, matches an organisation's internal factors (strengths and weaknesses) against the external factors of its competitive environment (opportunities and threats), yielding four strategy types: aggressive (SO), conservative (WO), competitive (ST), and defensive (WT). Its inherent weakness, however, is that it provides no built-in mechanism for weighing the relative importance of the identified factors. The Analytic Hierarchy Process, developed by Saaty, compensates for this shortcoming by decomposing the decision problem into goal, criteria, and alternative levels and calculating the weight of each element through pairwise comparisons and the eigenvector of the comparison matrix. Integrating these two tools — known in the literature as the combined SWOT-AHP approach — converts experts' qualitative judgements into comparable quantitative scores, bringing the Internal Factor Evaluation (IFE) and External Factor Evaluation (EFE) matrices closer to genuine quantitative measurement than to approximate ranking. The conceptual framework of the present study rests on this same logic: identifying the four SWOT factor groups through interviews and field observation, weighting them with AHP, determining the terminal's strategic position in the Internal–External matrix, formulating strategic options from the intersection of factors in the SWOT matrix, and finally prioritising these options with QSPM.

At the national level, prior research shows that the SWOT approach has been widely applied to the analysis of Iranian port operations. For example, Abbasi et al. [1] ranked the factors affecting optimal container-terminal operations using the Bernardo decision-making method and emphasised the importance of infrastructural and managerial factors. Heidari-Arjelou et al. [2], using a data envelopment analysis (DEA-AP) approach, compared the technical efficiency of Khorramshahr's container terminal with other Iranian ports and showed that it achieved mid-range rankings in some periods. Khalili and Sheikhi-Hafshejani [3], using AHP, examined the role of multimodal transport in raising Khorramshahr Port's productivity and identified insurance, fuel, and loading/unloading operations as the most influential sub-criteria. Raeisi, Shahdadi and Abir [4] used the fuzzy Delphi method to analyse the factors affecting cargo and container dwell time at Chabahar Port. Although these studies provide valuable insight into the operational issues of southern Iranian ports, they are largely confined to a single dimension (technical efficiency, multimodal transport, or cargo dwell time) and lack an integrated strategic framework that simultaneously covers a terminal's internal and external environment and prioritises alternative strategies.

At the international level, recent studies — mainly from the past three years — have applied the combined SWOT-AHP approach and related multi-criteria decision methods to the strategic analysis of ports and container terminals; four representative examples, together with their strengths, limitations, and relationship to the novelty of the present study, are reviewed below. In the Iranian context specifically, Pourkermani identified and ranked the factors shaping performance in maritime transport more broadly using a multi-branch decision-making approach grounded in utility theory, underlining the value of structured multi-criteria methods for this sector [5]. Bouazza, Benmamoun and Hachimi [6], combining fuzzy AHP and TOPSIS, assessed the competitiveness of ten leading Mediterranean and Northern European hub ports across five dimensions — cost, operational efficiency, infrastructure, sustainability, and geographical location; the study's strength lies in its comparative, multi-port scale, but its exclusive focus on large transhipment ports limits the generalisability of its findings to smaller regional ports such as Khorramshahr. Xiao [7], combining competitive-position analysis with AHP, formulated a sustainable regional logistics development strategy for China and emphasised the weighting of environmental and economic indicators; the study's strength lies in its explicit link between AHP and exponential-smoothing forecasting of logistics data, though it overlooks inter-port competition and four-cell SWOT matrix analysis. Gasparotti et al. [8], using questionnaires and interviews at three Romanian ports, identified smart-port transition strategies with SWOT and ranked them with AHP; this study is methodologically closely aligned with the design of the present research (combined questionnaire-and-interview data followed by AHP), though its main focus is digitalisation and environmental-impact reduction rather than comprehensive assessment of physical infrastructure and equipment. Hsu et al. [9], using a combined DEMATEL-fuzzy AHP method, analysed the relocation policy for dispersed container terminals within a single port across four dimensions — port advantage, port governance, return on investment, and investment cost — and showed that investment-attraction incentives and intra-port co-competition are the most important indicators; this finding is conceptually consistent with the "private sector participation" strategy that achieved the highest QSPM priority in the present study. Finally, Eyit and Yorulmaz [10], using DEMATEL, identified the factors affecting loading/unloading efficiency at container terminals — including human resources, equipment adequacy, weather conditions, managerial factors, yard physical condition, technology infrastructure, smart-port applications, and occupational safety — and found human resources, equipment adequacy, and occupational safety to be the most influential factors; this list overlaps substantially with the internal factors identified at Khorramshahr terminal (equipment, skilled personnel, weather conditions), strengthening the external validity of the present findings.

A comparative review of these five international studies shows that, although the SWOT-AHP approach and its relatives (fuzzy AHP, DEMATEL-AHP, AHP-TOPSIS) are increasingly used in port competitiveness analysis and policymaking, most of this research either focuses on large transhipment ports [6] or covers only a specific dimension, such as digitalisation [8] or terminal relocation [9]; few studies have integrated the nine-cell IE matrix, the SWOT strategic matrix, and the QSPM matrix for a developing mid-tier container terminal comparable to Khorramshahr. The novelty of the present study lies precisely here: first, unlike most domestic studies that weight SWOT factors using the Friedman method, this study is the first, in the context of Iranian container terminals, to weight factors entirely through the Analytic Hierarchy Process; second, it presents the complete strategic-analysis chain — from factor identification to final strategy prioritisation with QSPM — for a developing terminal with limited capital resources, offering a model that could be applied to comparable ports in the Persian Gulf region; third, its findings are compared with, and validated against, recent international evidence on the importance of investment-attraction incentives and equipment adequacy [9,10].

Building on the above, this research seeks to answer two main questions: first, can integrating the SWOT matrix with the Analytic Hierarchy Process serve as a valid, practical method for analysing and prioritising container-terminal operational strategies? Second, what are the most important internal and external factors affecting container operations at Khorramshahr Port, and, based on their relative and final weight, which strategies should be prioritised for implementation? To answer these questions, the study's sub-objectives are: to identify the strengths, weaknesses, opportunities, and threats affecting container operations at Khorramshahr Port; to weight these factors using AHP and determine the terminal's strategic position in the Internal–External matrix; and to quantitatively prioritise alternative strategies through the Quantitative Strategic Planning Matrix.

2. Materials and Methods

This study is applied in purpose and descriptive-analytical in method, combining quantitative and qualitative data. The statistical population comprised all expert staff of active shipping companies, specialists from the Ports and Maritime Organization and

Khorramshahr Customs, and drivers and operators involved in container loading and unloading, estimated at 50 individuals. Given the specialised nature of the subject, purposive and convenience sampling was used to select respondents, and, applying Cochran's formula (with p = q = 0.5 and an allowable error of d = 0.1), a sample size of 20 was determined from among specialists, experts, and authorities working at the port and customs house. Of these, 65% held a master's degree and 35% a bachelor's degree, and 75% had more than five years of relevant work experience, indicating the sample's specialist adequacy for AHP pairwise-comparison judgements.

Data were collected in three stages. In the first stage, desk research — including a review of domestic and international literature, Ports and Maritime Organization reports, and terminal technical documents — was used to extract the preliminary variables affecting container-terminal performance. In the second stage, semi-structured, flexible interviews were held with officials, experts, drivers, and other active port stakeholders; this interview format, while preserving an overall question framework, allows the interviewer to ask supplementary questions and obtain deeper, more qualitative information. In parallel, the researcher observed and documented actual loading and unloading processes through fieldwork at the container terminal. In the third stage, based on the literature review and interview findings, two sets of questionnaires were designed: the first for identifying and preliminarily ranking internal and external factors, and the second (pairwise comparisons) for weighting these factors using AHP. Both questionnaires were distributed to, and completed by, the 20-person sample.

The analytical framework combined the SWOT model with the Analytic Hierarchy Process and was implemented in four general steps. The first step was to define the organisation's mission and vision and identify internal factors (strengths and weaknesses) and external factors (opportunities and threats). Since the existing Khorramshahr container terminal lacks a formal mission and vision statement, the approved vision document of the container terminal under construction — aiming to become the region's leading container terminal by the 2020 horizon with an operational capacity of five million TEU per year — was used as a reference guide. The second step was designing the AHP hierarchical structure, in which the top level was the overall goal (prioritising terminal development strategies), the middle level comprised the four SWOT criteria groups (strengths, weaknesses, opportunities, threats) and their sub-criteria (24 factors in total), and the bottom level comprised the alternative strategic options. For each level, a pairwise-comparison questionnaire based on Saaty's nine-point scale (from equal preference, scored 1, to absolute preference, scored 9) was prepared, and the 20 experts' responses were aggregated using the geometric mean. The consistency ratio (CR) of all pairwise-comparison matrices was calculated and found to be below the acceptable threshold of 0.1, indicating that experts' judgements were logically consistent.

The third step was to develop the Internal Factor Evaluation (IFE) and External Factor Evaluation (EFE) matrices. For each strategic factor, a relative importance weight (derived from the final AHP weight, summing to one) and a rating of the terminal's response to that factor (from 1 to 4; for strengths and opportunities a higher rating is better, while for weaknesses and threats a lower rating indicates a greater weakness) were determined. The product of the weight and rating gave each factor's weighted score, and the sum of the weighted scores gave the final score for each matrix; a final score above 2.5 indicates a relative superiority of strengths over weaknesses (in the IFE) or of opportunities over threats (in the EFE). The fourth step was to construct the nine-cell Internal–External (IE) matrix from the intersection of the final IFE and EFE scores, and then to develop the four-quadrant SWOT strategic matrix (SO, WO, ST, WT) from the intersection of the leading strengths and weaknesses with the leading opportunities and threats. Finally, the Quantitative Strategic Planning Matrix (QSPM) was used to prioritise the proposed strategies quantitatively, with each strategy's attractiveness score (AS) obtained from the product of each factor's relative attractiveness score and its importance weight, summed across factors; the strategy with the highest total attractiveness score receives the top implementation priority. All matrix calculations were performed using spreadsheet software, and the results were independently reviewed by two members of the research team to ensure computational accuracy.

3. Results

In the first stage of the analysis, 24 strategic factors — 11 internal strengths and weaknesses and 13 external opportunities and threats — were identified through interviews, field observation, and questionnaires. At the internal level, four main strengths were identified: a 35% discount on container loading/unloading tariffs, adequate safety in the loading/unloading process, smooth and fluid port traffic, and favourable weather conditions for operations; and seven main weaknesses: the terminal's lag behind the approved development plan, a shortage of modern loading/unloading equipment, slow operational speed, the absence of standard yard markings, the lack of a dedicated container berth and quay, insufficient cargo-storage space, and the absence of a defined container-affairs department in the port's organisational chart. At the external level, seven opportunities were identified — including Khorramshahr's high level of security relative to Iraq, its unique geostrategic position, its proximity to Iraq and Kuwait, government financial support, Iranian transit contracts, and access for landlocked Central Asian countries — along with five threats, including international shipping sanctions, Iraqi investment in Umm Qasr Port, the presence of international operators at competing regional ports, distance from major production and consumption centres, and inadequate cooperation from other organisations with the port.

Table 1 presents the results of the Internal Factor Evaluation (IFE) matrix. The total weighted score of strengths was 1.890 and of weaknesses 0.474, giving a final IFE score of 2.364. As this score is slightly below the theoretical average of 2.5, it can be concluded that, overall, internal weaknesses outweigh the strengths of Khorramshahr Port's container terminal.

Table 1. Internal Factor Evaluation (IFE) matrix for Khorramshahr Port container terminal

Internal factor	Importance weight	Rating
Strengths		
S1: 35% discount on loading/unloading tariffs	0.168	4
S2: Adequate safety in the loading/unloading process	0.163	3
S3: Smooth, fluid port traffic	0.146	3
S4: Favourable weather conditions for operations	0.097	3
Total strengths	0.574	–
Weaknesses		
W1: Lag behind the approved development plan	0.086	1
W2: Shortage of modern loading/unloading equipment	0.079	1
W3: Slow loading/unloading operations	0.061	1
W4: Absence of standard yard markings	0.058	2
W5: Lack of a dedicated container berth and quay	0.051	1
W6: Insufficient cargo-storage space	0.047	1
W7: Container affairs not defined in the organisational chart	0.044	1
Total weaknesses	0.426	–
Total IFE score	1.000	–

Table 2 presents the results of the External Factor Evaluation (EFE) matrix. The total weighted score of opportunities was 1.716 and of threats 0.600 (a small discrepancy from the direct column sum reflects rounding in the source calculations), giving a final EFE score of 2.384. This indicates that Khorramshahr Port's container terminal performs at a level close to, but slightly below, average in exploiting environmental opportunities and countering external threats.

overall, internal weaknesses outweigh the strengths of Khorramshahr Port's container terminal.

Table 2. External Factor Evaluation (EFE) matrix for Khorramshahr Port container terminal

External factor	Importance weight	Rating
Opportunities		
O1: Unique geostrategic position of the port	0.104	3
O2: Khorramshahr's high security relative to Iraq	0.096	4
O3: Proximity to Iraq and Kuwait	0.085	3
O4: Government financial support for port programmes	0.072	4
O5: Iranian transit contracts	0.066	3
O6: Access for landlocked Central Asian countries	0.053	3
O7: Key role in developing the country's southern corridor	0.040	3
Total opportunities	0.516	–
Threats		
T1: International shipping sanctions	0.114	1
T2: Iraqi investment in Umm Qasr Port	0.101	1
T3: Presence of international operators at competing ports	0.085	1
T4: Inadequate cooperation from other organisations with the port	0.062	2
T5: Distance from major production and consumption centres	0.048	2
Total threats	0.668	–

Total EFE score	1.000	–

* The small discrepancy from the direct column sum reflects rounding in the source calculations.

Plotting the final IFE (2.364) and EFE (2.384) scores on the nine-cell Internal–External matrix places Khorramshahr Port's container terminal in the fifth cell (the intersection of a medium internal level and a medium external level), corresponding to a "stability" or "conservative" strategic position: here, the organisation seeks to compensate for its internal weaknesses by drawing on environmental opportunities, without being in a fully aggressive position. This finding is consistent with the four-quadrant Internal–External matrix (with strong/medium/weak axes), which likewise places the terminal in the first (conservative) cell. Under SWOT-matrix logic, a conservative position specifically recommends WO (weakness–opportunity) strategies as the priority strategy group.

From the intersection of internal and external factors in the SWOT matrix, four strategy groups were formulated. SO strategies (leveraging strengths and opportunities simultaneously) included physical and infrastructural port development, attracting foreign investors, focusing on the Asian market, and implementing a landlord port management model. WO strategies (covering weaknesses by drawing on opportunities) included improving port equipment and machinery, strengthening research and development (R&D), focusing on and penetrating potential markets (particularly the Iraqi transit market), and encouraging private-sector participation in port activities. ST strategies (using strengths to reduce the impact of threats) included increasing fuel bunkering, designing a competitive pricing structure, and achieving the performance indicators of leading ports; and WT strategies (simultaneously reducing weaknesses and threats) included maintaining current practice without structural change and cooperating with smaller regional ports. Since the terminal's strategic position falls in the conservative cell, the four WO strategies were carried forward as final candidates for quantitative prioritisation in the QSPM matrix.

Table 3 summarises the QSPM results for the four WO strategies. The strategy "private sector participation in port activities," with a total attractiveness score of 7.200, achieved the highest priority, followed in order by "improving port equipment and machinery" (7.055), "focusing on and penetrating potential markets" (6.374), and "strengthening research and development" (6.063).

Table 3. Ranking of WO strategies based on the QSPM matrix

WO strategy	Total internal factor score	Total external factor score	Total attractiveness score	Priority
Private sector participation in port activities	3.409	3.791*	7.200	1
Improving port equipment and machinery	3.448	3.607*	7.055	2
Focusing on and penetrating potential markets (Iraqi market)	3.192	3.182*	6.374	3
Strengthening research and development (R&D)	3.380	2.683*	6.063	4

* External-factor scores for each strategy are derived by subtracting the internal-factor score from the total QSPM score.

Overall, the results of this section show that, although Khorramshahr Port's container terminal enjoys certain competitive advantages — such as competitive tariffs, operational safety, and geostrategic position — infrastructural and equipment weaknesses, together with external threats stemming from sanctions and regional competition, keep the terminal in the conservative zone of the strategic matrix; among the proposed responses, private-sector participation was identified as the most effective lever for moving out of this position.

4. Discussion and Conclusion

The findings of this study show that integrating the SWOT matrix with the Analytic Hierarchy Process is a valid, practical tool for analysing and prioritising container-terminal operational strategies. Unlike traditional SWOT analyses, which rank factors on the basis of qualitative judgement or non-parametric tests such as Friedman's, the AHP approach enables the relative and final weight of each factor to be calculated through systematic pairwise comparisons, and the consistency ratio computed in this study (below 0.1 for all comparison matrices) indicates the logical coherence of experts' judgements. This finding is consistent with Gasparotti et al. [8], who, in their analysis of Romanian ports, likewise used a combined questionnaire-interview approach followed by AHP to prioritise smart-port transition strategies and emphasised the method's reliability in port settings with limited data resources.

The close final scores for the IFE (2.364) and EFE (2.384) matrices — both slightly below the theoretical average of 2.5 — indicate that Khorramshahr Port's container terminal faces internal constraints (weak equipment and infrastructure) alongside external challenges (sanctions and regional competition) simultaneously. This pattern is consistent with the findings of Heidari-Arjelou et al. [2], who placed this terminal's technical efficiency in mid-range rankings relative to Shahid Rajaee Port, and with Khalili and Sheikhi-Hafshejani [3], who identified weak multimodal-transport infrastructure as a factor limiting Khorramshahr Port's productivity. Internationally, the high importance of equipment adequacy and skilled human resources — identified in this study as the leading internal weaknesses — aligns meaningfully with Eyit and Yorulmaz's [10] DEMATEL analysis of loading/unloading efficiency factors, which likewise identified equipment adequacy, human resources, and occupational safety as the most influential factors, reinforcing the external validity of the present findings. Similarly, the relative superiority of security and geostrategic opportunities over sanctions-related threats is consistent with Bouazza et al. [6], who identified geographical location and infrastructure as determinants of competitiveness among Mediterranean hub ports; although, unlike the large transhipment ports studied there, Khorramshahr Port faces sanctions-related constraints with no direct precedent in the European or East Asian port literature.

The terminal's placement in the conservative cell of the Internal–External matrix, and the priority given to the "private sector participation in port activities" strategy in the QSPM matrix, theoretically supports the view that, in state-owned ports with budgetary constraints — such as Khorramshahr, where only one private company, with limited equipment and personnel, currently handles loading and unloading — reliance on state resources alone is insufficient for infrastructure modernisation, and private investor participation can help fill the capital gap. This finding is consistent with Hsu et al. [9], who identified investment-attraction incentives and intra-port co-competition as the most important indicators of container-terminal relocation and development policy, indicating that this pattern is not confined to the Iranian context but is recognised internationally as an effective strategy. Practically, this finding suggests that the Khorramshahr Ports and Maritime Organization should establish the conditions and incentives needed to transfer part of loading/unloading operations to the private sector, while allocating part of its budget to completing the approved development plan and holding regular training courses for operators and forklift drivers to raise operational quality. Given Khorramshahr Port's cost advantage (tariff discounts) and the security difficulties facing Iraqi ports, actively marketing to attract Iraqi transit cargo — the third-ranked QSPM strategy — could increase the terminal's market share in the short term without requiring major infrastructural investment. This cost advantage is itself consistent with Iranian research identifying tariff design as a key lever of port competitiveness [11].

Like any empirical study, this research has limitations. First, although the expert sample size (20 individuals) is acceptable for specialist interviews and AHP pairwise comparisons — for which the methodological literature considers five to a maximum of twenty adequate — the limited population of local staff and specialists reduces the direct generalisability of the findings to other Iranian container terminals. Second, factor weighting rests on experts' subjective judgement, and although the AHP process controls the consistency ratio, it remains exposed to individual and organisational response bias; applying fuzzy AHP methods in future research, as used by Gasparotti et al. [8] and Eyit and Yorulmaz [10], could better manage this uncertainty. Third, this study analysed a specific point in time, and environmental dynamics such as changes in sanctions or fluctuations in regional trade could alter the relative weight of factors over time; future research is therefore recommended to repeat this analysis periodically. Future studies could also combine SWOT with other multi-criteria decision-making methods, such as TOPSIS or fuzzy ANP, or a balanced scorecard, and could assess the effect of the proposed strategies — particularly private-sector participation — on quantitative terminal performance indicators, such as vessel dwell time and crane productivity, through a longitudinal study. Such work could also draw on operations-research perspectives on green and sustainable port logistics to situate the terminal's development strategies within a broader sustainability agenda [12].

In summary, this research shows that, despite its outstanding geostrategic position and its cost and safety advantages, Khorramshahr Port's container terminal occupies a conservative strategic position owing to equipment and infrastructural weaknesses and external threats stemming from sanctions and regional competition; WO-group strategies — particularly private-sector participation, equipment modernisation, R&D development, and penetration of the Iraqi transit market — chart the priority path for enhancing the terminal's competitive position. The integration of SWOT and AHP in this study demonstrates that this combined approach can provide a scientific, replicable framework for the strategic planning of other developing container terminals, particularly the small and mid-sized ports of the Persian Gulf region.

5. References

[1] Abbasi, A., Kianimoghadam, M., Saeidi, S., & Nooramin, A. (2012). Investigating and ranking the factors affecting optimal operations in

container terminals using the Bernardo decision-making method. Journal of Marine Science and Technology, 11(3), 70–80.

[2] Heidari-Arjelou, S., Yousefi, H., & Rashnoudi, A. G. (2021). Efficiency evaluation of Khorramshahr port container terminal using the DEA-AP approach. International Conference on Marine-Centered Sustainable Development.

[3] Khalili, M., & Sheikhi-Hafshejani, S. (2021). Evaluating the role of multimodal transport in increasing Khorramshahr port productivity using the Analytic Hierarchy Process (AHP). National Conference on Architecture, Civil Engineering, Urban Planning and Islamic Art.

[4] Raeisi, F., Shahdadi, H., & Abir, M. S. (2019). Analysis of factors affecting cargo and container dwell time at Chabahar port. 1st National Conference on Marine Sciences, Industries and Sustainable Development of the Makran Coast.

[5] Pourkermani, K. (2022). Identifying and ranking the affecting factors for performance enhancement in maritime transport with a multi-branch decision-making approach based on the utility theory. Journal of Oceanography, 13(49), 1–13. https://doi.org/10.52547/joc.13.49.1

[6] Bouazza, S., Benmamoun, Z., & Hachimi, H. (2024). Strategic analysis of hub port competitiveness in the Mediterranean and Northern Europe: A focus on sustainability and efficiency. AIMS Environmental Science, 11(2), 184–220.
https://doi.org/10.3934/environsci.2024010

[7] Xiao, C. (2024). Sustainable logistics development strategy based on SWOT and analytic hierarchy process. PLoS ONE, 19(10), Article e0312560. https://doi.org/10.1371/journal.pone.0312560

[8] Gasparotti, C., Ungureanu, C., Popescu, G., & Domnisoru, L. (2026). Strategies for developing Romanian seaports as smart ports. Sustainability, 18(3), Article 1658. https://doi.org/10.3390/su18031658

[9] Hsu, W. K., Ngoc Le, T. N., Huynh, N. T., Tai, H. H., & Van Thanh, T. (2025). Relocation policy for container terminals in a seaport: A gap index approach using hybrid DEMATEL-fuzzy AHP. Journal of Marine Science and Technology, 30, 677–692. https://doi.org/10.1007/s00773-025-01074-y

[10] Eyit, B., & Yorulmaz, M. (2025). A DEMATEL-based analysis of factors influencing cargo handling efficiency in container terminals. Ekonomi Maliye İşletme Dergisi, 8(1), 30–45. https://doi.org/10.46737/emid.1698221

[11] Pourkermani, K., & Sharifi, A. (2018). Identifying the factors affecting the design of port tariffs. Journal of Transportation Research, 15(3), 79–91.

[12] Pourkermani, K., & Nemati, M. (2021). Operations research in green logistics: A look at dimensions, aspects, issues, contributions and challenges. Road, 29(1), 95–114.