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AN ANALYTIC HIERARCHY PROCESS (AHP) APPROACH FOR PRIORITIZATION OF EXPORT DEVELOPMENT STRATEGIES IN UZBEKISTAN

PhD ***Turdibaeva Munisa***
Westminster International University in Tashkent
ORCID: 0000-0002-7082-879X
mturdibaeva@gmail.com

Abstract. *This study applies the Analytic Hierarchy Process (AHP) to evaluate and prioritize export development strategies for Uzbekistan. The methodology incorporates national strategic priorities outlined by the President, government policy documents, and the opinions of expert economists and senior officials. Based on this foundation, relevant criteria and their weights were derived. The analysis identifies enhancing product competitiveness as the top strategy, with significant implications for national policy.*

Keywords*: export strategy, Uzbekistan, economic priorities, AHP, competitiveness, national programs.*

O‘ZBEKISTONDA EKSPORTNI RIVOJLANTIRISHNING USTUVOR STRATEGIYASINI TANLASH UCHUN ANALITIK IERARXIYANI QAYTA ISHLASH (AHP) USULI

PhD ***Turdibayeva Munisa***
Toshkentdagi Xalqaro Vestminster universiteti

Annotatsiya*. Ushbu tadqiqot O‘zbekiston eksportini rivojlantirish strategiyalarini baholash va ustuvorligini aniqlash uchun Analitik ierarxiya jarayonini (AHP) qo‘llaydi. Metodologiyada Prezident tomonidan belgilab berilgan milliy strategik ustuvorliklar, davlat dasturlari, shuningdek, iqtisodchi ekspertlar va yuqori mansabdor shaxslarning fikrlari inobatga olingan. Shu asosda mezonlar va vaznlar shakllantiriladi. Tahlil shuni ko‘rsatadiki, mahsulotlarning raqobatbardoshligini oshirish yetakchi strategiya bo‘lib, bu davlat siyosati uchun muhim ahamiyatga ega.*

Kalit so‘zlar*: eksport strategiyasi, iqtisodiy ustuvorliklar, ierarxiyalar tahlili usuli (ITU), raqobatbardoshlik, milliy dasturlar.*

МЕТОД АНАЛИЗА ИЕРАРХИЙ (МАИ) ДЛЯ ВЫБОРА ПРИОРИТЕТНОЙ СТРАТЕГИИ РАЗВИТИЯ ЭКСПОРТА В УЗБЕКИСТАНЕ

PhD ***Турдибаева Муниса***
Международный Вестминстерский университет в городе Ташкенте

Аннотация*. В данном исследовании применяется метод анализа иерархий (МАИ) для оценки и приоритизации стратегий развития экспорта Узбекистана. Методология учитывает национальные стратегические приоритеты, определённые Президентом, правительственные программы, а также мнения экспертов-экономистов и руководящих чиновников. На этой основе сформированы критерии и веса. Анализ выявляет повышение конкурентоспособности продукции как ведущую стратегию, что имеет важное значение для государственной политики.*

Ключевые слова*: стратегия экспорта, экономические приоритеты, метод анализа иерархий (МАИ), конкурентоспособность, национальные программы.*

Introduction.

Uzbekistan is actively reforming its foreign trade sector in alignment with its long-term development strategies. In recent years, a number of presidential decrees, government programs, and national strategies have been adopted to strengthen the country's export potential. Choosing the optimal path for export growth requires a structured and transparent decision-making method. This paper employs the Analytic Hierarchy Process (AHP), developed by Thomas Saaty in (1980), to prioritize export strategies based on well-defined national priorities and expert opinions.

The purpose of this study is to substantiate the priority areas of export development of Uzbekistan using the method of hierarchy analysis, which will improve the efficiency of the country's export policy and ensure sustainable growth of the foreign trade sector.

To achieve this goal, the study solves the following tasks: (i) Analyze current trends and strategic goals of Uzbekistan's foreign economic policy, (ii) Formulate criteria for assessing and ranking export strategies based on state priorities, (iii) Construct a hierarchical model for making decisions on the choice of export strategies, (iv) Conduct an expert assessment and aggregate data using the method of hierarchy analysis, (v) Determine priority areas of export policy for the medium term and formulate practical recommendations.

Literature Review.

The first structured method of making multi-criteria decisions, called the Analytic Hierarchy Process (AHP), was developed by Thomas Saaty (1980). Since then, AHP has become widespread and is still actively used in management practice. AHP allows complex decisions to be broken down into a hierarchy of subtasks, each of which can be analyzed independently. It is widely used in management, strategic planning, policy analysis, and resource allocation, especially in situations involving both qualitative and quantitative factors. Forman and Gass (2001) provided brief descriptions of successful AHP applications. Vaidya and Kumar (2006) provided a detailed review of the literature on the application of AHP.

Among CIS researchers, Zinenko (2014), Botnaryuk (2018), and some others have studied the application of AHP in solving national economic management problems.

In Uzbekistan, this area of management science is currently represented only in the form of educational and methodological support for the training of management personnel of civil servants.

Methodology.

AHP allows complex decisions to be decomposed into a hierarchy of sub-problems, each of which can be analyzed independently. It is widely used in strategic planning, policy analysis, and resource allocation, particularly in situations involving both qualitative and quantitative factors.

At first stage, a set of alternative decisions is formulated, and a decision maker has to choose a prioritized decision among alternatives by making use an AHP approach.

At the second stage, a set of criteria is formulated based on brain storming or discussion or individually by a decision maker. However, these criteria have to be ranked by the experts who are proficient in the field under consideration. For this purpose, a pairwise comparison matrix of criteria is compiled by experts. Sometimes, the decision maker can independently compare the criteria in pairs, thereby determining their priority by assigning a score, a_{ij}. The aggregated comparison matrices are normalized, and the priority vectors (weights) are derived by averaging normalized rows.

Then each column is summed and the values are divided by the column sum, i.e., the pairwise matrix of criterion comparisons is normalized. For each cell:

$$a_{ij}^{norm} = a_{ij} / \sum_{i=1}^{n} a_{ij} \qquad (1)$$

where a_{ij} = initial pairwise score, a_{ij}^{norm} = normalized pairwise score.

The normalized pairwise comparison matrix is a key step in the analytic hierarchy process (AHP) to quantify the relative importance of criteria in decision making.

At this stage, each element of the matrix reflects the share of significance of the corresponding criterion in the column, i.e., the relative value compared to others. This is achieved by dividing the value of the element in the original matrix by the sum of the values of the corresponding column. The rows of the normalized matrix show how important each criterion is compared to the others for each feature (column), with all values scaled from 0 to 1. The sum for each column in the normalized matrix is 1. This ensures data comparability and correct calculation of weights. The final weights of the criteria (priority vector) are calculated as the arithmetic mean of the values in the row, reflecting the average significance of each criterion relative to others. Thus, the normalized matrix allows systematizing subjective expert assessments and obtaining objective weighting coefficients suitable for further analysis and decision-making within the framework of the hierarchical model. After normalization, the weights of the criteria (priorities) are calculated. This is the average value for the row:

$$w_j = \frac{1}{n}\sum_{i=1}^{n} a_{ij}^{norm} \quad (2)$$

At fourth stage, a consistency check (Consistency Ratio – CR) is performed. Consistency Ratios (CR) are calculated to ensure logical coherence of expert judgments. First, the consistency index is calculated:

$$CI = \frac{\lambda_{max} - n}{n - 1} \quad (3)$$

where λ_{max} – maximum eigenvalue of a matrix. The consistency ratio is then calculated:

$$CR = \frac{CI}{RCI} \quad (4)$$

where *RCI* – random consistency index (for example, for *n=5*: *RCI = 1.12*).
If CR < 0.10, consistency is considered acceptable.

At fifth stage, the strategy priority scores accross criteria are obtained on the basis of expert evaluations, using the Saaty scale (from 1 to 9), where: 1 – equal importance/significance, 3 – moderate advantage, 5 – strong advantage, 7 – very strong, 9 – absolute advantage, and 2, 4, 6, 8 – intermediate values.

The procedure for obtaining strategy assessments based on criteria is as follows: (i) a matrix of pairwise comparisons of strategies is formed for each criterion (separately), for example, for the criterion S1 "Economic efficiency" compared with S2, S1 with S3, etc. (ii) experts give judgments on which strategy is more important and by how much for each criterion, in a paired format (for example, if S2 is 2 times more important than S1 then score is equal to 2), (iii) A matrix of pairwise comparisons is built, normalized, and average values are calculated by rows, i.e., local weights of strategies for this criterion, (iv) to simplify interpretation, these local weights are multiplied by 9 and rounded to an integer: the results are strategy scores from 1 to 9 for each criterion.

Sometimes the assessments are set directly by the experts, bypassing the comparison matrix, especially if the number of strategies is small and the criteria are well defined. In this case: (i) a group of experts individually or collectively assigns each strategy a score from 1 to 9 for each criterion, (ii) these scores are aggregated (averaged or agreed upon), (iii) the values used in the calculations are obtained.

Finally, at the last stage, it is necessary to obtain the final scores of the strategies based on the weighted sum method:

$$S_j = \sum_{i=1}^{n} w_i r_{ij} \quad (5)$$

where:

- w_i = weight of the i-th criterion (from AHP),
- r_{ij} = rating of the j-th strategy under the i-th criterion.

To quantify the relative importance of the above criteria and assess the performance of each export strategy, structured interviews have been conducted with nine experts, including senior policymakers, academic economists, and trade practitioners. Using Saaty's fundamental scale (1–9), experts provided pairwise comparisons for both criteria and alternatives.

The selection of criteria was informed by a triangulation of sources: (i) presidential policy directives of the Republic of Uzbekistan, especially the strategic tasks defined in the "Uzbekistan - 2030" Strategy adopted by Presidential Decree of February 21, (2024), (ii) national export development programs (for instance, one of them has been approved by Presidential Decree of the Republic of Uzbekistan of March 14, (2025)), (iii) reports delivered by international and national organizations (for instance, OECD, 2022; IMF, 2024; NAS, 2024), (iv) expert consultations with economists, trade specialists, and government officials, who provided practical insights into feasibility, risks, and implementation timelines. Based on this foundation, five criteria were identified as most relevant for evaluating Uzbekistan's export development strategies, and the criteria weights have been assigned based on the expert evaluations which show the relative importance of five criteria identified through expert interviews and analysis of national strategic documents:

C1 – "Economic Efficiency" received the highest weight (0.30), indicating that maximizing economic returns is the foremost consideration in selecting export strategies.

C2 – "Feasibility" ranks second (0.25), highlighting the importance of practical implementation within existing institutional and financial capacities.

C3 – "Sustainable Development Contribution" is given notable weight (0.20), reflecting Uzbekistan's policy alignment with long-term ecological and inclusive growth goals.

C4 – "Time to Effect" (0.15) indicates a moderate preference for strategies that can yield faster results.

C5 – "Political Risk", although the least weighted (0.10), is still considered relevant, especially in strategies involving regional integration and foreign policy implications.

Table 1

Pairwise matrix of comparisons of criteria

Criterion	C1	C2	C3	C4	C5
C1	1	1.5	2	3	4
C2	2/3	1	1.5	2	3
C3	1/2	2/3	1	1.5	2
C4	1/3	1/2	2/3	1	1.5
C5	1/4	1/3	1/2	2/3	1

(The numbers are obtained by averaging the ratings of 9 experts on the Saaty scale of 1–9)

These weights illustrate that decision-makers prioritize economically impactful and realistically implementable strategies, while also considering sustainability and time horizons.

Then, in the second stage, a pairwise matrix of comparisons of criteria was built based on the evaluations made by experts.

Then each column is summed up, and the values are divided by the column sum, i.e., the pairwise matrix of criterion comparisons is normalized, and as a result, we obtain a normalized pairwise matrix of criterion comparisons (Table 1). This matrix shows that economic efficiency as a criterion received the highest value across all columns, especially in comparison with less significant criteria.

Table 2

Normalized Pairwise Comparison Matrix

Criterion	C1	C2	C3	C4	C5
C1	0.364	0.375	0.353	0.367	0.348
C2	0.242	0.250	0.265	0.245	0.261
C3	0.182	0.167	0.176	0.184	0.174
C4	0.121	0.125	0.118	0.122	0.130
C5	0.091	0.083	0.088	0.082	0.087

The normalized matrix demonstrates a balanced, but economically oriented approach to assessing export strategies. The most important criteria are economic efficiency and feasibility, while political risks and the time factor are of secondary importance. Such a distribution is logical for a developing country striving for sustainable economic growth in a limited institutional environment.

The consistency rate was: $CI = (\lambda max - n)/(n-1) = (5.825 - 5)/4 = 0.206$. From the Saaty table we obtain the random consistency index: $CI = 1.12$ для $n = 5$. Now let's calculate the consistency ratio: $CR = CI/RCI = 0.206/1.12 \approx 0.184$. Since $CR = 0.184 > 0.10$, the level of consistency is at the border of the acceptable. It is advisable to conduct clarification with experts to improve consistency, but in research practice CR values up to 0.2 are sometimes acceptable under complex criteria.

Table 3

Weights, Eigenvalues, and Consistency Calculation

Criterion	w_i	λ_i	$(\lambda_i - n)w_i$
C1	0.30	6.33	0.399
C2	0.25	5.80	0.200
C3	0.20	5.38	0.076
C4	0.15	5.50	0.075
C5	0.10	5.75	0.075
Intermediate result	—	—	0.825
Maximum Eigenvalue (λ_{max})		5.825	

Table 4 presents how each of the four export development strategies scores against the five criteria:

S2 – Enhancing Product Competitiveness consistently scores high across most criteria, especially in *economic efficiency (8)* and *sustainable development (8)*, confirming its broad strategic appeal,

S1 – Market Diversification performs well in *economic efficiency (7)* and *political risk (7)*, indicating its potential to reduce dependence on specific markets,

S3 – Export Infrastructure Development scores lower in *time to effect (4)* and *feasibility (5)*, reflecting the high resource demands and long lead times typically associated with infrastructure projects,

S4 – Regional Integration achieves a strong score in *time to effect (7)*, as trade bloc membership can yield relatively fast access benefits, but it is penalized in *political risk (4)* due to potential sovereignty concerns.

This table shows that while all strategies offer value, there is clear variation in their suitability based on policy priorities and contextual constraints. Each export strategy is evaluated against the five criteria using a 1–9 scoring scale. The final composite scores were computed using the weighted sum model according to formula (5). For example, the final score for strategy S1 (Market diversification) was calculated as follows:

$S1 = (0.30 \cdot 7) + (0.25 \cdot 6) + (0.20 \cdot 5) + (0.15 \cdot 6) + (0.10 \cdot 7) = 2.10 + 1.50 + 1.00 + 0.90 + 0.70 = 6.25.$

Table 4

Strategy scores against criteria (scale 1–9)

Strategy	C1	C2	C3	C4	C5
S1	7	6	5	6	7
S2	8	7	6	8	6
S3	6	5	4	7	8
S4	7	6	7	5	4

The final aggregate scores for each strategy after applying AHP weighting and score normalization are as follows: (i) Enhancing Product Competitiveness achieves the highest integrated score (7.25), affirming it as the top-ranked strategy under current national conditions, (ii) Market Diversification comes second (6.25), showing that diversification remains a robust option, albeit slightly less impactful than direct competitiveness measures, (iii) Regional Integration follows closely (6.05), reflecting mixed potential—moderate feasibility and faster returns but higher political sensitivity, and (iv) Infrastructure Development scores lowest (5.85), mainly due to concerns over time and feasibility, despite long-term value. These results quantitatively support the prioritization of competitiveness as a strategic pillar while recognizing the auxiliary role of other approaches. Figure 1 graphically illustrates the final integrated scores of the four evaluated export development strategies based on the Analytic Hierarchy Process (AHP).

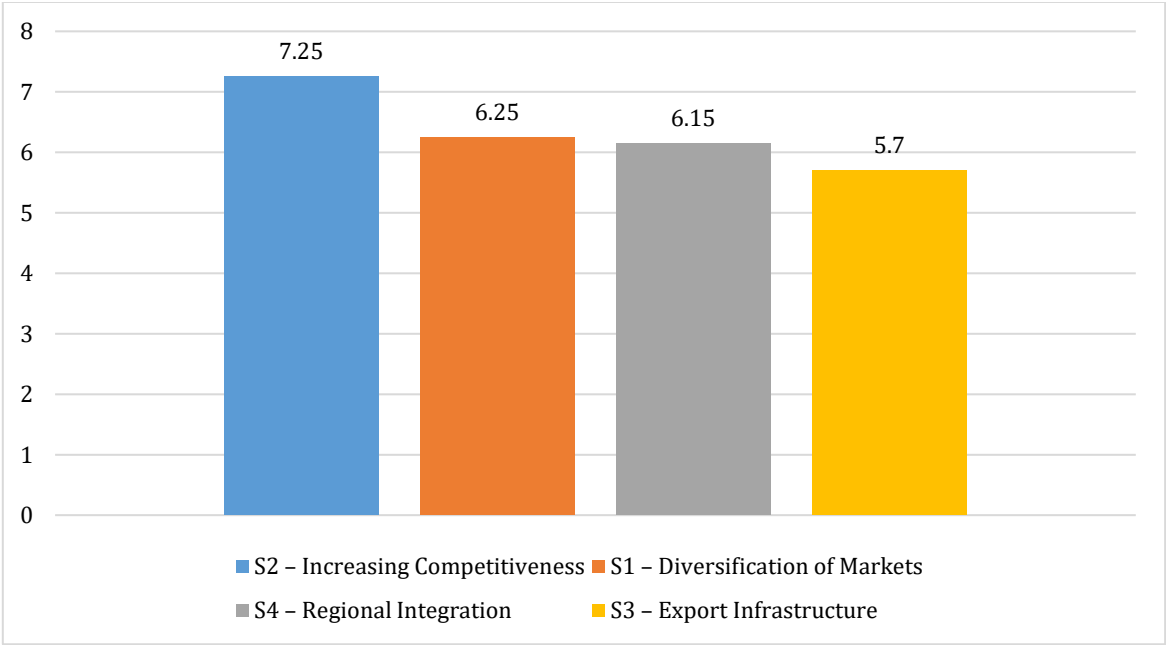

Figure 1. Integrated scores of export development strategies

This figure visually emphasizes the strategic preference for policies that deliver relatively fast, economically efficient, and sustainable results, while also highlighting trade-offs between political feasibility, investment scale, and timing.

Discussion.

The analysis confirms that the strategy of enhancing export product competitiveness (S2) is the most favorable under current national priorities. This approach is consistent with the Presidential goals of increasing added value, improving product standards, and promoting branding. While diversification and infrastructure development remain important, they require greater resource allocation and longer timeframes. Integration into trade blocs, though beneficial, carries political risks that must be balanced with sovereign interests. Moreover, regarding the strategy “Increasing competitiveness” (S1), the highest scores were obtained for the criteria “Economic efficiency”, “Feasibility”, “Speed of effect”. This result is consistent with practice. Thus, the Development Strategy "Uzbekistan - 2030" directly emphasizes the course on increasing the competitiveness of the national economy, including the development of exports, innovations and industry. The program for localization, import substitution and support of non-resource exports is actively financed and administered.

Despite the stated goals, not all initiatives are implemented with equal efficiency due to: low labor productivity; limited access to modern technologies; shortage of qualified personnel; limitations in logistics and infrastructure.

Conclusion.

By incorporating national strategies, official priorities, and expert feedback, this study applies the AHP method to rank export strategies for Uzbekistan. The results advocate prioritizing competitiveness as a foundation for long-term export growth.

The results of this study are generally consistent with current practice in Uzbekistan: increasing competitiveness is indeed a key focus of the state strategy. This is reflected both in strategic planning documents and in ongoing institutional and economic reforms.

The methodology can support evidence-based policymaking in the area of foreign trade. Further research may involve broader surveys and dynamic adjustments of criteria weights as economic conditions evolve.

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