

Application of Analytical Hierarchy Processing to Export Strategy Prioritization

The Case of Uzbek Exporters in the Russian Market

Author: Munisa Turdibaeva, PhD

*Affiliation: Westminster International
University in Tashkent*

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Research Question

- ❑ The problem of choosing an export strategy belongs to the class of semi-structured multi-criteria problems, where numerous mutually exclusive factors must be considered: the company's internal competencies, the external market environment, logistical constraints, and financial risks.
- ❑ Traditional decision-making methods are often intuitive and can lead to suboptimal results.
- ❑ The purpose of this study is to demonstrate the application of Analytic Hierarchy Process (AHP) to solve the problem of choosing the optimal export strategy for Uzbek enterprises.

Research Tasks

1. Based on survey data, identify key criteria for selecting an export strategy and determine their relative importance.
2. Evaluate alternative promotion strategies based on each criterion.
3. Build a hierarchical decision-making model and calculate integrated strategy priorities.
4. Formulate practical recommendations for exporters and government support agencies.

Literature Review (1/2)

- The analytic hierarchy process, first proposed by Thomas Saaty (1980), is the ability to decompose a problem into hierarchical structures, facilitating policy analysis where qualitative strategic objectives must be weighed against quantitative feasibility constraints.
- The choice of criteria in such models is of paramount importance and, as in this study, in other studies they are often derived through triangulation of official policy documents, reports from international organizations and opinions of expert groups to ensure relevance and reliability (e.g., Kahraman, 2008; Önüt, 2010)

Literature Review (2/2)

- In the context of export strategy development, the studies highlight the ineffectiveness of a one-size-fits-all approach. Strategies must be tailored to a country's specific stage of development, its institutional capacity, and its industrial base (Forman & Gass, 2001; Vaidya, O. S., & Kumar, S., 2006).
- The literature review reveals a clear gap: despite the widespread use of AHP and the well-documented economic challenges of countries like Uzbekistan, there is a lack of research that rigorously applies the structured MCDM approach to prioritizing export strategies specifically for Uzbekistan, directly taking into account its unique national priorities and expert opinions.

Methodology

The method's procedure includes the following steps:

1. **Problem decomposition:** Construction of a hierarchy including the goal, criteria, subcriteria (if necessary), and alternatives.
2. **Paired comparisons:** Pairwise comparison of elements at each level relative to the element at the higher level. The standard Saaty scale of relative importance, ranging from 1 (equal importance) to 9 (absolute importance), is used for comparisons.
3. **Priority synthesis:** Calculation of local priority vectors for each element of the hierarchy. Verification of the consistency of judgments by calculating the consistency index (CI) and the consistency ratio (CR). $CR < 0.10$ is considered acceptable.
4. **Global priority synthesis:** Determining the final weights of alternatives by weighted summation of their local priorities across all criteria.

Methodology Overview (AH

1. Hierarchy Construction:

- Criteria (5) + Strategies (5)

2. Expert Surveys:

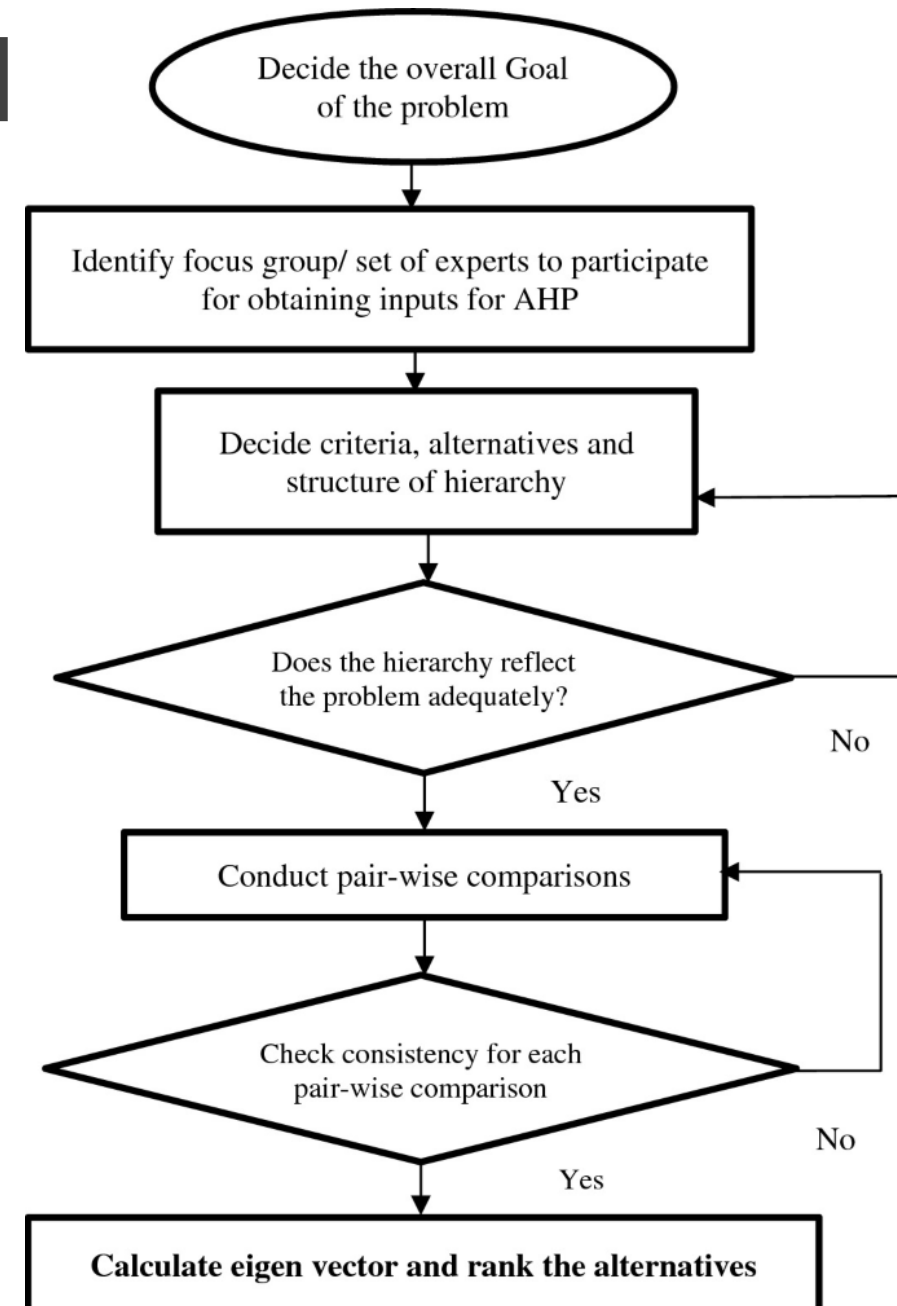
- 20 experts (policymakers, economists)

3. Pairwise Comparisons:

- Saaty scale (1–9)

4. Weighted Scoring:

- Aggregate rankings



Methodology – AHP Formulas

1. Normalization:

$$a_{ij}^{norm} = \frac{a_{ij}}{\sum_{i=1}^n a_{ij}}$$

(Normalize pairwise comparisons)

2. Weight Calculation:

$$w_j = \frac{1}{n} \sum_{i=1}^n a_{ij}^{norm}$$

(Row averages = criteria weights)

3. Consistency Check:

$$CR = \frac{CI}{RCI}, \text{ where } CI = \frac{\lambda_{max} - n}{n - 1}$$

(CR < 0.10 acceptable)

4. Global Priority Score for a Strategy j :

$$S_j = \sum_{i=1}^n w_i r_{ij}$$

Notation	Meaning
a_{ij}	Initial pairwise comparison score (Saaty scale: 1–9) from expert judgments.
a_{ij}^{norm}	Normalized value of a_{ij} (scaled to 0–1).
$\sum_{i=1}^n a_{ij}$	Sum of all scores in column j .
w_j	Weight (priority) of criterion j .
n	Number of criteria.
λ_{max}	Maximum eigenvalue of the pairwise matrix.
CI	Consistency Index (measures logical coherence).
RCI	Random Consistency Index (predefined for matrix size).
CR	Consistency Ratio (should be <0.10).
w_i	weight of the i -th criterion
r_{ij}	rating of the j -th strategy under the i -th criterion

Data Collection and Hierarchy Building

- ❑ To populate the MAI model with data, a survey of 20 Uzbek exporters operating in the Russian market was conducted.
- ❑ The sample included executives and key managers from companies across various industries (textiles, food, construction materials, etc.) with between one and more than three years of export experience.
- ❑ Based on the questionnaire, a three-level hierarchical model was constructed:
 - Level 1: Goal – choosing the optimal export strategy.
 - Level 2: Factors as Criteria (K)
 - Level 3: Alternative Strategies (A)

Factors as Criteria (K) and Alternative Strategies (A):

- ☐ K1: Price Competitiveness
- ☐ K2: Product Quality
- ☐ K3: Logistics and Delivery Time
- ☐ K4: Branding and Recognition
- ☐ K5: Payment Flexibility

- ☐ A1: Direct Sales
- ☐ A2: Working with Distributors
- ☐ A3: E-Commerce (Marketplaces)
- ☐ A4: Participation in Exhibitions
- ☐ A5: Joint Projects

- The average ratings given by experts on a 9-point scale were aggregated and transformed into paired comparison matrices for the criteria level and for the alternatives level for each criterion.

Evaluations of 20 respondents based on criteria (factors)

Criterion (factor)	All the 20 evaluations
K1: Price competitiveness	5, 7, 9, 4, 9, 4, 1, 8, 7, 6, 2, 3, 5, 7, 8, 5, 9, 7, 5, 8
K2: Product quality	7, 7, 9, 5, 9, 9, 6, 8, 6, 5, 3, 2, 3, 7, 8, 7, 9, 7, 7, 6
K3: Logistics	4, 7, 9, 5, 9, 9, 5, 7, 7, 4, 3, 4, 4, 7, 8, 7, 9, 4, 5, 5

We aggregate the scores: we take the average value for each criterion (factor):

K4: Branding and Recognition	3, 7, 9, 5, 9, 9, 6, 7, 8, 5, 5, 4, 5, 7, 8, 6, 8, 7, 5, 5
K5: Payment flexibility	5, 8, 5, 9, 7, 5, 8, 5, 8, 4, 4, 4, 4, 7, 8, 9, 9, 8, 6, 5
K1: (5+7+9+4+1+8+7+6+2+3+5+7+5+9+7+5+8)/20=6.0	
K2: (7+7+9+5+9+9+6+8+6+5+3+2+3+7+8+7+9+7+7+6)/20=6.6	
K3: (4+7+9+6+9+4+5+5+8+4+4+4+4+7+8+9+9+8+6+5)/20=6.0	
K4: (3+7+9+5+9+9+6+7+8+5+5+4+5+7+8+8+8+7+5+5)/20=6.4	
K5: (4+7+9+6+9+4+5+5+8+4+4+4+4+7+8+9+9+8+6+5)/20=6.1	

Construction of a matrix of pairwise comparisons of criteria

We use the ratio of average ratings:

Table 1. Matrix of pairwise comparisons of criteria

Criterion	K1	K2	K3	K4	K5
K1	1	$6.0/6.6 = 0.91$	$6.0/6.0 = 1.0$	$6.0/6.4 = 0.94$	$6.0/6.1 = 0.98$
K2	$6.6/6.0 = 1.10$	1	$6.6/6.0 = 1.10$	$6.6/6.4 = 1.03$	$6.6/6.1 = 1.08$
K3	$6.0/6.0 = 1.0$	$6.0/6.6 = 0.91$	1	$6.0/6.4 = 0.94$	$6.0/6.1 = 0.98$
K4	$6.4/6.0 = 1.07$	$6.4/6.6 = 0.97$	$6.4/6.0 = 1.07$	1	$6.4/6.1 = 1.05$
K5	$6.1/6.0 = 1.02$	$6.1/6.6 = 0.92$	$6.1/6.0 = 1.02$	$6.1/6.4 = 0.95$	1

Results: Computing Criteria Priorities and Their Analysis

- At the next stage, we sum the columns of the matrix of pairwise comparison of criteria and divide each element by the sum of the column and take the average by rows:
 - **Priority vector (weighting coefficients):**
 - K2: Product quality – 0.210
 - K4: Branding – 0.205
 - K5: Payment flexibility – 0.201
 - K1: Price competitiveness – 0.195
 - K3: Logistics – 0.189
- **Interpretation:** This result indicates that for Uzbek exporters, non-price competitive factors (quality, branding, payment flexibility) carry a greater weight than the price factor (0.195). This reflects a desire to secure a stable market niche rather than compete solely on low prices.

Computing Consistency Ratio (CR)

$$\lambda_{\max} = (5.04 + 4.77 + 5.20 + 4.88 + 4.93)/5 \approx 4.964$$

$$CI = \frac{\lambda_{\max} - n}{n - 1} = \frac{4.964 - 5}{5 - 1} = \frac{-0.036}{4} \approx -0.009$$

- For a 5×5 matrix, Random Consistency Index (**RCI**) = **0.9**
- **So, Consistency Ratio (CR) = CI/RCI = -0.01 (< 0.10)**, which indicates almost ideal agreement between the experts' judgments. Factor weights can be used to analyze strategies without adjustments.

Results: Evaluation of Alternative Strategies/Interpretation (1/2)

Table 1. Average ratings per strategy for each criterion

Criterion / Strategy	Direct Sales	Distributors	E-commerce	Exhibitions	Joint Projects
Price	7	7	7	7	7
Quality	4	5	5	5	6
Logistics	9	9	9	9	3
Branding	4	5	5	5	6
Payment Flex.	4	5	5	5	6

Now, we have to normalize these numbers to get **local priorities**. For each criterion, divide each strategy's score by the sum of all strategies under that criterion.

Results: Evaluation of Alternative Strategies/Interpretation (1/2)

Table 1. Local priorities per criterion

Strategy / Criterion	Price	Quality	Logistics	Branding	Payment Flexibility
Direct Sales	0.20	0.16	0.231	0.16	0.16
Distributors	0.20	0.20	0.231	0.20	0.20
E-commerce	0.20	0.20	0.231	0.20	0.20
Exhibitions	0.20	0.20	0.231	0.20	0.20
Joint Projects	0.20	0.24	0.077	0.24	0.24

Key Insights from Local Priorities:

- When price is the main concern, all strategies are seen as equally relevant. No one strategy dominates in price-driven scenarios
- To emphasize quality, collaborating with Russian partners (Joint Projects) is slightly preferred.
- If flexible payment terms matter most, Joint Projects allow better negotiation or customized arrangements.

Results: Computing of global priorities/Interpretation (1/2)

$$\text{Global priority} = \sum (\text{Criterion weight} \times \text{Local priority of strategy under that criterion})$$

Table 2. Global priorities of strategies

Strategy / Criterion	Global Priority
Direct Sales	0.182
Distributors	0.206
E-commerce	0.206
Exhibitions	0.206
Joint Projects	0.200

Results: Computing of global priorities/Interpretation (2/2)

- ❑ Distributors, E-commerce, and Exhibitions are the top strategies (≈ 0.206).
- ❑ Joint Projects is slightly behind (0.200) — strong for quality, branding, and payment flexibility but weaker in logistics.
- ❑ Direct Sales is the lowest (0.182) — good for logistics but weaker for quality and branding.
- ❑ Overall, using the AHP global priorities, **a mixed approach with Distributors, E-commerce, and Exhibitions is optimal** for entering the Russian market.

Discussion

- ❑ This study demonstrated the practical applicability of the analytic hierarchy process to solving the complex multi-criteria problem of choosing an export strategy. Formalizing expert assessments allowed managers' subjective preferences to be quantified and alternatives to be objectively ranked.
- ❑ Further research could focus on a more in-depth analysis of individual industries and on incorporating additional criteria into the model, such as geopolitical risks or government regulation.

Key findings of the study

1. Quality is the top concern, while branding and payment flexibility are slightly less critical, and price and logistics are moderately important
2. Joint Projects are preferred when quality, branding, and payment flexibility are key priorities
3. Working with distributors is a strong complementary strategy, particularly for reducing pricing pressure.

Insight: For entering the Russian market, a combination of Distributors, E-commerce, and Exhibitions is the most effective overall. Joint Projects are valuable in specific areas (quality, branding), while Direct Sales alone is less effective.

Strategic Implications

1. Balanced approach recommended: Combining multiple strategies (Distributors + E-commerce + Exhibitions) can cover both operational efficiency and market visibility.
2. Focus on quality and partnerships: To differentiate products, companies should leverage joint projects or collaborations with Russian partners.
3. Price and logistics management remain critical: Even if quality is top priority, efficient delivery and competitive pricing are essential to succeed.
4. Flexibility in payment and branding: Joint projects can help offer flexible payment options and boost brand recognition where needed.

Thank You!