

Selecting The Best Customer for A Plan to Reduce Wildlife Trade Based on A Comprehensive Evaluation Model

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Abstract. In order to reduce the negative impact of illegal wildlife trade on ecology and socio-economic development, this article proposes a plan called "Wildlife Trade Trap: Five Year Strategic Plan", which covers key areas such as policy, publicity, education, economic development, and international cooperation. This article constructs a comprehensive evaluation model based on Analytic Hierarchy Process (AHP), which allocates indicators such as publicity, education, fundraising, and social impact according to weights. The report provides a comprehensive analysis of the strengths of WWF, Traffic, UN Environment, and IUCN in reducing the illegal wildlife trade. The results show that IUCN is the best customer for executing projects.

Keywords: Hierarchical Analysis, Comprehensive Evaluation Model, Best Customer.

1. Introduction

The illegal wildlife trade is valued at up to \$26.5 billion per year and poses a serious threat to global ecosystems and endangered species, making it the fourth largest illegal trade in the world [1]. Urgent action is imperative to mitigate its detrimental effects, protect vulnerable species, and maintain ecological equilibrium and biodiversity [2]. A proposed solution involves implementing a data-driven, five-year project utilizing scientific data, technology, and an integrated approach to substantially decrease illegal wildlife trade, thereby fostering biodiversity conservation.

In order to successfully implement the project, potential clients need to be carefully selected and may be international organizations, government agencies, NGOs, or businesses. This article selected and quantified metrics related to client power, resources, and interests (Table.1). Then, a comprehensive evaluation model was built based on the data and the best client was identified. Then searched for the client's strength points and accessed what the client could do in our program.

1.1. Project Description

Table.1. Five year project plan

Name	Wildlife Trade TRAPS: Five-Year Strategic Plan
Objective	(1) Significantly reduce illegal wildlife trade (2) Conserve global biodiversity (3) Raise public awareness of wildlife conservation.
Key areas	Policy, Public awareness, Education, Sustainable economic development, Technological innovation, international cooperation [3].
Data	Utilizing enforcement, social impact, international cooperation, implementation, resource mobilization, and publicity/education data from the IUCN, WWF, Traffic and UN Environment.
Strategy	Legislative: Make policy recommendations based on data analysis for stricter regulations.
	Law Enforcement: Strengthen international and domestic cooperation and enhance technology.
	Publicity and Education: Conduct multi-level education activities to enhance awareness.
	Technological Innovation: Develop new means to improve efficiency.
	International Cooperation: Strengthen collaboration to tackle transnational trade [4].
Implementation plan	Gradual reduction targets with a focus on regulation, training, technology, community involvement, and evaluation.
Expected results	(1) Reduction in illegal animal trade occurrence.
	(2) Enhanced enforcement effectiveness.
	(3) Improved international cooperation.
	(4) Increased community participation and awareness.
	(5) Establishment of sustainable development mechanisms for ongoing wildlife protection efforts.

2. Choose the best customer who can execute the project

2.1. Construction of model

The study analyzes the relationships between various factors, including Policy (P), Sustainable Economic (SE), Publicity Education (PE1) [5], Project Execution (PE2), Funding (F), Social Influence (SI) and International Cooperation (IC) [6], and establish a hierarchical structure, which is shown in Figure 1. The study is looking for a client whose plans and objectives should be aligned with the project and for an entity with the authority, resources and interest in implementing the project. Therefore, the study selected WWF, Traffic, UN Environment and IUCN as the clients to be selected.

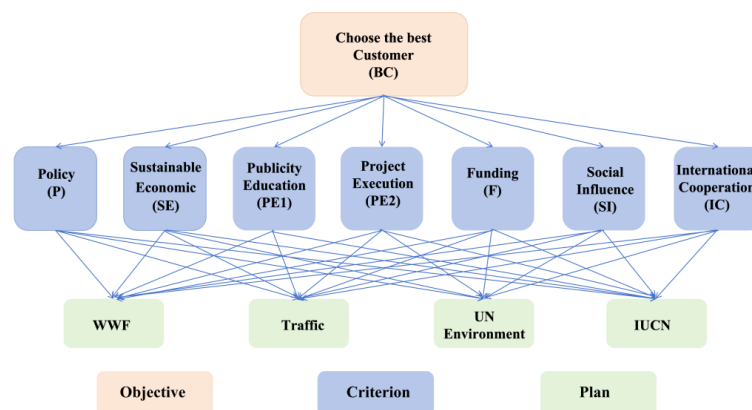


Figure 1. Hierarchical structure

2.2. Algorithm step

2.2.1 Analytic hierarchy process

The study chooses analytic hierarchy process for analyzing:

Table.2. Definition of scale

scale	meaning
1	Compared to two indicators, they have the same execution ability
3	Compared to two indicators, one indicator has slightly stronger execution ability than the other indicator
5	Compared to two indicators, one indicator has significantly stronger execution ability than the other indicator
7	Compared to two indicators, one indicator has a very strong execution ability compared to the other indicator
9	Compared to two indicators, one indicator has extremely strong execution ability compared to the other indicator
2, 4, 6, 8	The median of the two adjacent judgments mentioned above
count backwards	If the scale between A and B is 3, then the scale between B and A is 1/3

The study compares two by two the importance (satisfaction) of these five indicators mentioned above for the selection of the final tourist attraction. To determine the relative importance, the study uses 1-9 indicating the degree of importance, which are shown in Table 2. In the hierarchical analysis method, the importance of indicator i compared to indicator j is represented by the corresponding element a_{ij} , which can be found in Table 3-Table 5. Every indicator should compare and score different subjects. Moreover, before using the judgement matrix to find the weights, the consistency test should be performed to ensure the reasonableness of the data [7].

Table.3. Indicator judgment matrix

	P	SE	PE1	PE2	F	SI	IC
P	1	1	5	3	2	8	4
SE	1	1	5	2	2	6	3
PE1	1/5	1/5	1	1/2	2	2	1
PE2	1/3	1/2	2	1	1/2	3	1
F	1/2	1/2	1/2	2	1	4	2
SI	1/8	1/6	1/2	1/3	1/4	1	1/2
IC	1/4	1/3	1	1	1/2	2	1

Only two judgment matrices are shown here because of space limits.

Table.4. Policy judgment matrix

P	WWF	Traffic	UN	IUCN
WWF	1	3	2	2
Traffic	1/3	1	1/2	1/2
UN	1/2	2	1	1
IUCN	1/2	2	2	1

Table.5. Sustainable Economic judgment matrix

SE	WWF	Traffic	UN	IUCN
WWF	1	2	1/2	1/2
Traffic	1/2	1	1/2	1/2
UN	2	2	1	1
IUCN	2	2	1	1

Consistency check steps:

Step 1: Calculate the consistency indicator CI [8]

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

Step 2: Get the corresponding average random consistency index RI

Step 3: Using formula to calculate the consistency ratio CR

$$CR = \frac{CI}{RI} \quad (2)$$

If $CR < 0.1$, the consistency of the judgment matrix is acceptable, otherwise it needs to be adjusted [7].

Consistency test through judgement matrix for seven indicators, the CR values are 0.0455, 0.0921, 0.0227, 0.0039, 0.0039, 0.0039, 0.0016, and 0.0876, all of which are less than 0.1. As a result, the consistency of the above judgment matrices is acceptable.

2.2.2 Solve the weights of each indicator

There are three methods for calculating weights using consistency matrices, namely: arithmetic mean (A), geometric mean (G), and eigenvalue method (E) [9].

(1) Calculating weights using the arithmetic mean method

The calculation formula of the arithmetic mean method is as follows:

$$\omega_i = \frac{1}{n} \sum_{j=1}^n \frac{a_{ij}}{\sum_{k=1}^n a_{kj}} \quad (3)$$

Step 1: Normalize the consistency matrix in accordance with column (dividing element by sum of its column)

Step 2: Add the normalized columns (sum by row)

Step 3: Divide each element in the added vector by n to get the weight vector

(2) Geometric averaging method for calculating weights

The calculation formula of the arithmetic mean method is as follows:

$$\omega_i = \frac{\left(\prod_{j=1}^n a_{ij} \right)^{\frac{1}{n}}}{\sum_{k=1}^n \left(\prod_{j=1}^n a_{kj} \right)^{\frac{1}{n}}} \quad (4)$$

Step 1: Multiply the elements of matrix A in accordance with rows to obtain a new column vector

Step 2: Open each component of the new vector to open nth power

Step 3: Normalize the column vector to get the weight vector

(3) Eigenvalue weighting

Step 1: Calculate the maximum eigenvalue of matrix and the corresponding eigenvector

Step 2: Normalize the feature vectors to calculate weights. Due to space constraints, only two tables are shown here.

Table.6. Three Weights of Policies

P	A	G	E
WWF	0.4029	0.4057	0.4033
Traffic	0.1175	0.1171	0.1155
UN	0.2171	0.2180	0.2152
IUCN	0.2625	0.2592	0.2659

Table.7. Three Weights of Sustainable Economic

SE	A	G	E
WWF	0.2002	0.1972	0.1996
Traffic	0.1418	0.1394	0.1404
UN	0.3290	0.3317	0.3300
IUCN	0.3290	0.3317	0.3300

After comparing the arithmetic mean method, geometric mean method, and eigenvalue method for calculating weights, it can be known that the weights obtained by the eigenvalue method are the values in the middle of the three values in many cases. In order not to too low or high weights, we choose to use the eigenvalue method to calculate weights.

3. Result

3.1. Identify the best customer

This study multiplied the values of seven indicators for each institution with the weights of the corresponding indicators and then added them to obtain the total score for each institution, as shown in Table 8 below.

Table.8. Three Weights of International Corporation

	Weight	WWF	Traffic	UN	IUCN
P	0.2972	0.4233	0.1155	0.2152	0.2659
SE	0.2626	0.1996	0.1404	0.33	0.33
PE1	0.0906	0.2672	0.0827	0.4959	0.1542
PE2	0.1043	0.2672	0.1542	0.0827	0.4959
F	0.1311	0.1516	0.0758	0.2827	0.4899
SI	0.0365	0.0989	0.0989	0.5183	0.2839
IC	0.0777	0.2565	0.1672	0.4925	0.0828
Score		0.2737	0.1213	0.2984	0.3124

Comparing the comprehensive scores of the four major institutions, it can be seen from the table that IUCN has the highest score and is most suitable for taking over this project. The client we have chosen is IUCN.

3.2. The contribution that the best customer can make to the project

(1) Rights:

IUCN has developed and published international guidelines on nature conservation and sustainable development for reference. It also provides policy advisory services to Governments and international organisations to promote environmental sustainability and biodiversity conservation [10].

(2) Funding:

IUCN received funding through donations from Member States, program sponsor- ships, foundations and corporate partnerships [10].

(3) Technology:

IUCN conducted biodiversity research, monitoring and data collection to support program decisions and actions.

(4) Human resources:

IUCN had scientists, ecologists and professionals in specialized fields from all over the world who can provide their expertise in nature conservation to support the organ- ization's efforts [10].

(5) Impact:

IUCN has had a positive impact on policy development at the international and national levels through the publication of reports, the provision of advice and advocacy activities. Its voice was respected internationally, and it was often consulted by governments and other stakeholders in the development of environmental policies.

(6) Concerns about the illegal wildlife trade:

Illegal wildlife trade was one of the main causes of the endangerment of many species. It is precisely because the impact of lost species on ecosystems can be irreversible and threaten ecological balance that IUCN is highly concerned about this issue.

IUCN is actively involved in wildlife trade monitoring, enforcement and species conservation projects, and also pays close attention to the impact of the illegal wildlife trade on local communities and the potential for promoting wildlife conservation through sustainable economies.

4. Conclusion

In order to reduce the incidence of illegal wildlife trade, this article proposes a five-year driving plan that combines multiple factors that affect project execution and uses a comprehensive evaluation model to screen out organizations that can minimize illegal wildlife trade to the greatest extent possible.

The experimental results indicate that the IUCN organization is the best client for implementing projects, and compared to the other three organizations, IUCN has more advantages in Policy, Sustainable Economy, Public Education, Project Execution, Funding, Social Influence, and International Corporation. The research in this paper informs the target audience for the implementation of projects to combat illegal wildlife trade.

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