

Wildlife Conservation National Selection Study Based on Logic Tree Analysis with TOPSIS

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Abstract. Given the rampant illegal trade in wildlife in recent years and the severe damage to the ecological environment and global public resources, there is an urgent need to take action to protect wildlife. This paper proposes a complete rare animal breeding project plan as an alternative to the illegal wildlife trade, and establishes an achievable degree index model: first, the McKinsey logical tree analysis is used to find the necessary indicators needed for the project. Secondly, the hierarchical analysis method is used to calculate the index weight, and finally the TOPSIS method is used to calculate the attainable degree index (ADI). The ADI in China is 0.8065, becoming the best customer to achieve the project goals.

Keywords: Conservation Animals, Hierarchical Analysis, TOPSIS, Breeding Wildlife.

1. Introduction

1.1. Research Background

The acceleration of globalization has made international trade more active, but at the same time, illegal wildlife trade has a negative effect on the environment. The trade is estimated to reach \$26.5 billion a year, the fourth largest in illicit trade after drug trafficking, human trafficking and smuggling. This trade activity has seriously damaged the environment and biodiversity, leading to the decline and extinction of wild animals, and thus undermining the balance and stability of the ecosystem. Wildlife plays an important role in the ecosystem, and the reduction in its number will have negative effects on ecological processes such as the food chain, plant pollen and seed dispersal, and ultimately cause ecosystem destruction. In addition, the illegal wildlife trade may also pose a threat to human health, as some wildlife may carry diseases that may spread to human society through illegal trade. Illegal wildlife trade often accompanies criminal acts, such as trafficking and smuggling, which in turn has a serious impact on social security and stability.

Therefore, combating illegal wildlife trade, protecting wildlife and the ecological environment has become an important task of global environmental protection, and is also the core issue discussed in this paper.

1.2. Literature Review

The importance of wildlife protection cannot be ignored. Past researchers have put forward a variety of strategies and measures for the illegal wildlife trade. We have combed and summarized these advance studies. In his article, Liang pointed out that wildlife is of great significance to ecological balance and society, and proposed measures such as strengthening management, prohibiting excessive poaching, and strengthening the construction of a protection and management system. In addition, he stressed the importance of strengthening biodiversity research, which will help protect the survival and reproduction of wildlife and maintain the ecological balance^[1]. Chen Junxi's research also emphasizes the importance of protecting wildlife, and proposed similar countermeasures, including strengthening management, prohibiting excessive poaching, strengthening the construction of protection and management system, etc., but also emphasized the importance of strengthening biodiversity research^[2]. In addition, Qi Xin emphasized the necessity of

wildlife protection in his article, especially emphasizing the importance of wildlife in maintaining the balance of the ecosystem and protecting human interests. He proposed the countermeasures to improve laws and regulations, increase publicity, correctly utilize resources and strengthen environmental protection to promote the stability of ecological balance and protect wildlife resources^[3].

It can be seen that previous research mainly focuses on wildlife protection measures, such as strengthening management, legislative protection, publicity and education. Although some research results have been made, it still faces many problems and challenges. For example, poor enforcement of wildlife protection laws and inadequate management and supervision in some areas have led to the prohibition of excessive poaching and other activities. This paper starts from reducing the profit of the illegal trade and fundamentally curbing the illegal trade.

Due to the rampant illegal wildlife trade, protecting wildlife and the ecological environment has always been the general trend of contemporary society, and the country or region should consider how to prevent the illegal wildlife trade. Aiming at a few academic research wildlife conservation design projects and seeking target clients, this paper presents a large project plan to find suitable national or regional projects and persuade them to accept the project, aiming to protect biodiversity and reduce the illegal trade in wildlife, and thus maintain the ecological balance.

Given the core goal of reducing the illegal wildlife trade, we present a complete project and discuss the details of the project in depth. In addition, to identify potential target customers, we conducted a preliminary analysis of illegal wildlife trade markets around the world. During the analysis, it was found that the illegal wildlife trade market in Asia was the largest, so the research focused on Asian countries.

To ensure the accuracy and scientificity of the study, we propose and define the Attainable Degree Index (ADI). The ADI is a key indicator of whether a country meets customer standards. The higher the index, the more likely it is to be our customer.

To find the ideal customer, we built the achievability index model. The model gives the mathematical formula for calculating the ADI index to assess the potential of each country as a target client. By calculating and comparing ADI in different countries, we can find the best customers to achieve the project goals.

2. Problem Solving Steps

2.1. Project Proposed

To reduce the illegal wildlife trade and maintain biodiversity on Earth, we have launched a targeted project: —— Breeding rare animals as an alternative to the illegal wildlife trade (SIA).

In the process of project planning and implementation, we always adhere to the principle of valuing the number of animals, respect the ecological balance and biodiversity of the earth, and ensure that our efforts do not adversely affect the environment.

Our plan is mainly to replace the illegal trade by implementing strategies for raising rare animals. This not only provides the national legal system for animals to ensure proper care, but also legalized the formal production and sale of animals to replace the legalization of illegal trade channels. The core idea of the project is to establish a sustainable animal conservation and breeding program to ensure that rare animals thrive in a controlled environment, thereby reducing the pressure to capture wild populations.

In this project, animal breeding is the core link, closely related to the feed production and trade departments. As the foundation of the breeding industry, the breeding industry.

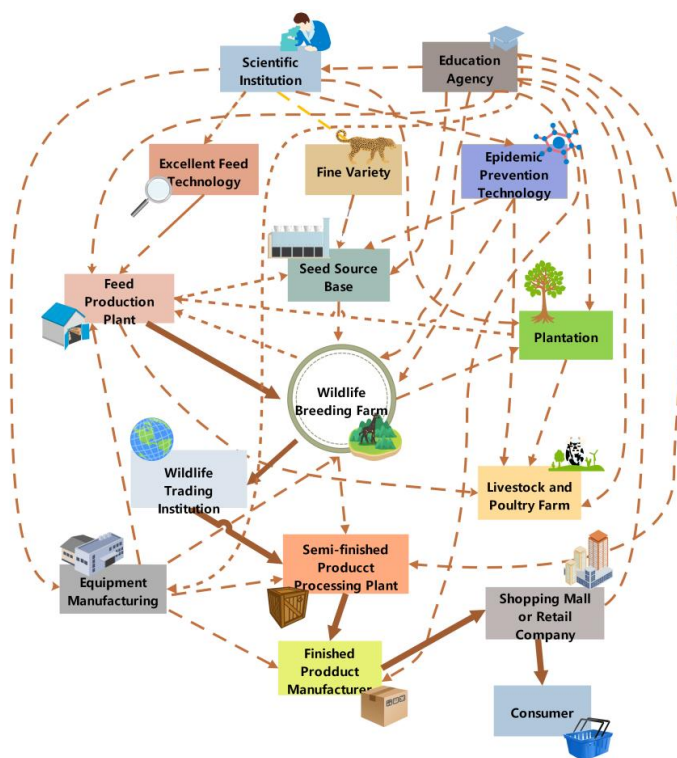


Figure 1: A Schematic diagram of the project industry chain

Good cooperation helps to improve economic efficiency and reduce illegal activities. Wildlife breeding industry is a platform supported by multiple industries, and its perfection degree and function are the key to industrial development^[4]. Only by ensuring the existence of these factors can the industry develop sustainably and healthily. Together, it has formed a basically complete industrial chain of "production, management and consumption" of wildlife breeding industry, as shown in Figure 1.

2.2. Method Description

TOPSIS (Technique for Order of Preference by Similarity to Ideal Solution) is a multi-objective decision-making method, the goal is to find the choice closest to the ideal and negative ideal solutions to provide comprehensive and comprehensive decision evaluation. In this study, based on the weight results obtained above, this paper makes full use of TOPSIS to conduct the final decision analysis. This analysis not only includes the comprehensive use of weights, but also proposes a calculation formula for ADI to more accurately measure the feasibility of an ideal solution.

Specifically, the calculation of ADI involves the logic of weight allocation, namely the relative importance of different factors in the overall assessment. Through the rational allocation of the weights, we are able to more accurately measure the contribution of the alternatives to the overall objective. The introduction of this computational formula allows us to further evaluate the feasibility and practical degree of the alternatives under the TOPSIS framework, thus providing a more logical and rigorous basis for the final decision.

2.3. Determine the Indicators

When screening customers, the main concern is whether they have the power, resources and enthusiasm needed to implement the project, which has a decisive impact on the success of the project. This model adopts the McKinsey logic tree analysis method, selecting the environment, technology, food and law as the key indicators based on its direct impact on project success. Evaluation of these aspects provides a more comprehensive understanding of whether the country meets the criteria as the target customer, thus selecting the clients with the best potential to achieve the project objectives. The specifically selected indicators are shown in Figure 2.

Environment: The target country has vast nature reserves, such as national parks and wildlife reserves. These areas provide rich ecosystems, such as the Amazon rainforest, the grassland areas around the Sahara desert, etc. Such natural environments provide an ideal habitat for breeding rare animals and help to simulate their living conditions in the wild. In addition, through the reasonable domestication and breeding and processing, in meet the market demand, guide consumers to eat or use safe domesticated products at the same time, also can expand the wildlife living space and environment, wild animal population scale growing, finally realize the sustainable and reasonable sustainable use of wildlife resources^[5].

Technology: The target country has made significant progress in zoological medicine and surveillance technologies. Using highly advanced tracking equipment, satellite images, and intelligent monitoring systems to monitor the behavior, health, and habitat changes in rare animals in real time. This technical support provides the project with data-driven management and the ability to respond in real time^[6].

Food: The target country has a diverse agricultural system to ensure an adequate food supply. Rich agricultural resources include rice fields, grain-growing areas and pastures, providing a balanced diet for raising rare animals. This helps to protect rare animals with the desired nutrients and improve their chances of health and reproductive success.

Law: The target countries have enacted strict wildlife protection laws and implemented active practical law enforcement. Illegal wildlife trade will be banned and offenders will face severe penalties. This regulatory environment helps to weaken the illegal trade network, provides legal protection for the artificial breeding of rare animals, and increases the feasibility and social support of the project^[7].

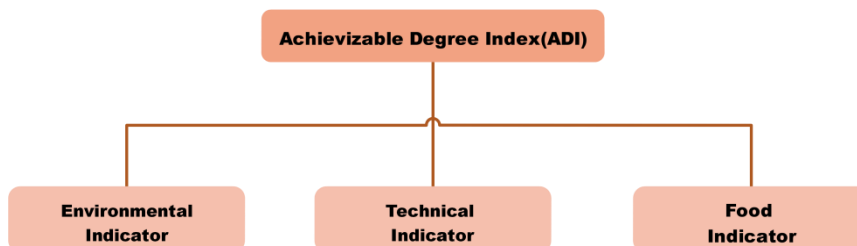


Figure 2: Indicators selected by McKinsey logic tree analysis

2.4. Weight Calculation

Next, we collected and analyzed the relevant data. In the case of frequent missing data, we removed the corresponding data to ensure data reliability. For those tolerable missing data, we chose to fill the gap using nearby terms or mean data from similar countries to ensure that the results we obtained are both accurate and contain sufficient information. Through this data processing process, we successfully obtained data from 48 countries and regions in Asia.

Subsequently, we performed the decision analysis using the analytical hierarchy process (AHP) and gave appropriate weight to each factor. AHP is a hierarchical multi-standard decision method, which can compare and weigh factors at different levels, which helps us to evaluate and select the optimal decision scheme more precisely^[8]. By AHP, we obtained the weight for each factor and calculated the composite score for each choice under the overall objective. This quantitative analysis provides a reliable basis for our decision-making and allows us to better understand it.

2.4.1 Constructs into a pairwise comparison matrix

At all levels, to ensure a rigorous assessment of the relative importance of each factor, we used a pairwise comparison matrix approach. This method quantitatively analyzed the relative importance between the factors by Delphi. These comparison matrices reveal the magnitude of how much hierarchical factors contribute to the overall objective. Specifically, we constructed a pairwise comparison matrix for each factor, as follows:

$$A = \begin{pmatrix} 1 & 3/4 & 3/2 & 3 \\ 4/3 & 1 & 2 & 4 \\ 2/3 & 1/2 & 1 & 2 \\ 1/3 & 1/4 & 1/2 & 1 \end{pmatrix} \quad (1)$$

2.4.2 Calculate the weight

During the calculation of the weights, we fully focus on the consistency of the pairwise alignment matrix, and use the consistency proportion and the consistency index to evaluate the degree of consistency of the expert opinions. The implementation of this step ensures that the reliability and validity of the weight calculation can be balanced. After the calculation, the matrix passed the consistency test, and the final weights are as follows:

$$\omega = (0.3 \ 0.4 \ 0.2 \ 0.1) \quad (2)$$

2.4.3 Interpretation of result

After verification and calculation, we draw the following conclusions: environment, technology, food and law in the overall evaluation of 30%, 40%, 20% and 10%, respectively. This weight allocation helps to elucidate the relative importance of each index in the comprehensive evaluation.

Environmental indicators account for 30% of the weight, and the natural, social and economic environment of customers should be fully considered, because a good environment contributes to the long-term development of customers. Technical indicators become the core of the evaluation, with a weight of 40%, focusing on the innovation, application and management level of customers in the technology field. In the era of rapid development of science and technology, technical strength is crucial to the competitiveness of customers. Food indicators account for 20% of body weight, assessing customer quality management and food safety measures in food production, processing, sales, and more, because food safety is crucial to people's quality of life and health. Finally, legal indicators account for 10% of the weight, focusing on customer compliance with laws and regulations and fulfilling social responsibilities, because legal compliance helps to build credibility and reputation. Technical indicators account for 40% of the weight, highlighting the core position of technical strength and innovation ability in today's market competition.

A comprehensive assessment of these four indicators will to a more accurate understanding of customer performance in all aspects and lay the foundation for targeted advice and support.

2.5. Achievable Degree Index (ADI)

We give the calculation formula for the ADI by using TOPSIS.

2.5.1 Forward forward matrix normalization

It is positively normalized on the basis of the weighted decision matrix. The purpose of this step is to ensure that the weight of each evaluation factor has a positive impact on the alternatives. The normalization formula is as follows:

$$z_{ij} = \frac{x_{ij}\omega_j}{\sqrt{\sum_{i=1}^n x_{ij}^2}} \quad (3)$$

2.5.2 Scores were calculated and normalized

We constructed each alternative into a decision matrix based on its score on different factors. The rows of this matrix represent different alternatives, and the columns represent each evaluation factor. Using the previously calculated weights, we weighted each alternative to obtain the weighted decision matrix and the ADI calculation formula.

According to the normalized matrix:

$$Z = \begin{pmatrix} 0.4333 & 0.9999 & 0.9953 & 0.7744 \\ 0.4580 & 0.0127 & 0.0532 & 0.4760 \\ 0.4481 & 0.0023 & 0.0352 & 0.2388 \\ 0.4530 & 0.0015 & 0.0701 & 0.2460 \\ 0.4432 & 0.0007 & 0.0188 & 0.2372 \end{pmatrix} \quad (4)$$

Defining Maximum:

$$Z^+ = (Z_1^+, Z_2^+, \dots, Z_m^+) \\ = (\max\{z_{11}, z_{21}, \dots, z_{n1}\}, \max\{z_{12}, z_{22}, \dots, z_{n2}\}, \dots, \max\{z_{1m}, z_{2m}, \dots, z_{nm}\}) \quad (5)$$

Defining Minimum:

$$Z^- = (Z_1^-, Z_2^-, \dots, Z_m^-) \\ = (\min\{z_{11}, z_{21}, \dots, z_{n1}\}, \min\{z_{12}, z_{22}, \dots, z_{n2}\}, \dots, \min\{z_{1m}, z_{2m}, \dots, z_{nm}\}) \quad (6)$$

Define the distance between i ($i=1,2,\dots, n$) and the maximum value:

$$D_i^+ = \sqrt{\sum_{j=1}^m (Z_j^+ - z_{ij})^2} \quad (7)$$

Define the distance between i ($i=1,2,\dots, n$) and the minimum value:

$$D_i^- = \sqrt{\sum_{j=1}^m (Z_j^- - z_{ij})^2} \quad (8)$$

The i ($i=1,2,\dots, n$) evaluation object score is calculated as:

$$S_i = \frac{D_i^-}{D_i^+ + D_i^-} \quad (9)$$

Finally, we define the ADI as:

$$ADI = S_i = \frac{D_i^-}{D_i^+ + D_i^-} \quad (10)$$

3. Results

3.1. Computing Result

After obtaining the weight of each index, the ADI can be calculated in the countries of 48 Asia with the ideal solution. Some of the results are shown in Table 1.

Table 1: The ADI display of the five Asian countries

Country	China	Thailand	Vietnam	Burma	Kampuchea
ADI	0.8065	0.2007	0.1663	0.1751	0.1607

3.2. Interpretation of Result

Based on the above results, this paper concluded that China is the ideal target customer. In the above weight allocation, China ranked first with an ADI score of 0.8065, indicating that China has achieved the highest degree in the comprehensive evaluation of various indicators. The assessment is based on ADI and it considers many factors including environment, technology, food and regulation. The results of this evaluation have an important guiding significance for our project implementation.

As a potential partner, China not only has advantages in terms of resource richness^[9], but also shows a high level in terms of environmental friendliness, protection means, technology leadership^[10], food safety, supervision and law enforcement^[11]. Therefore, this paper focuses on China as the cooperation target to promote the project, make full use of its advantages in all aspects, and promote the greater success of the project.

4. Conclusions

This paper presents a rare animal breeding program as an alternative to the illegal wildlife trade. McKinsey logical tree analysis, hierarchical analysis and TOPSIS method to select the most suitable countries for the implementation of the project. The article focuses on the environment, technology, food and law to assess whether the country meets the project objectives. The study found that Asia has the largest market for illegal wildlife trade, so the research focuses on Asian countries. Ultimately, a sustainable animal protection and breeding program was established to ensure that rare animals thrive in a controlled environment. The weights of the four indicators were calculated by using the pairwise comparison matrix method, namely environment, technology, food and law, and the weights were 0.3,0.4,0.2 and 0.1, respectively. The results show that China has the highest degree in the comprehensive evaluation of various indicators, ranking first with ADI score of 0.8065. China also shows a high level in resource richness, environmental friendliness, protection means, technological leadership, food safety, supervision and law enforcement efforts, so it is an ideal target customer.

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