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# A Multicriteria Analysis to Support Natural Resource Governance: The Case of Chestnut Forests

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**Abstract:** Efficient natural resource management prevents and reduces negative impacts, such as environmental damage, misappropriation of resources, and conflicts; several strategies can be leveraged to conserve, protect, and enhance natural resources. Multicriteria decision analysis (MCDA) is useful in providing solutions to addressing decision choice problems. In this study, the natural resource under evaluation is the chestnut forest, with the objective of valorising its supply chains. The methodology applied is A'WOT, which allows previously identified factors, using a qualitative SWOT matrix, to be ordered through an objective quantification using the AHP (analytic hierarchy process), which is a multicriteria decision support method. The survey was conducted with a group of chestnut resource ($n$ = 20) experts. The SWOT matrix identified a total of 20 factors: 6 strengths and 6 weaknesses and 4 factors each for opportunities and threats. The results express a clear stakeholder interest, which identifies the significant role of civil society in directing management choices for the provision and enhancement of ecosystem and vocational services. This study evaluated the adaptability of decision support tools applied to a real case of forest resource management to identify and order factors useful to enhance the resource and stimulate the supply chains to achieve greater added value. In a general sense, the methodological potential emerged to replicate or improve the research in other geographical regions, whether regional or extraregional, or even on a larger scale, such as on a national level.

**Keywords:** SWOT; AHP; A'WOT; decision-making; complex decisions; forest; chestnut valorisation



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## 1. Introduction

### 1.1. Governance of Natural Resources

The excessive extraction and use of natural resources contribute significantly to a triple planetary crisis, that is, climate, air pollution, and biodiversity loss [1]. According to the International Resource Panel, the exploitation of natural resources has tripled since 1970 and, without transformational changes, it will double again by 2060 [2].

This entails a change in the growth model and the decoupling of the concept of welfare from the massive use of natural resources. (Good) governance is a key element in addressing these crises, fostering sustainable development, and determining the effectiveness of natural resource conservation and management efforts. According to Graham et al. [3], governance here is defined as "the interactions among structures, processes and traditions that determine how power and responsibilities are exercised, how decisions are taken, and how citizens or other stakeholders have their say".

Good natural resource management prevents and reduces negative impacts such as environmental damage, overexploitation of resources, conflicts, and the loss of rights and secure livelihoods [4]. Conversely, it promotes the stability of natural ecosystems, provides greater support to local conservation initiatives, and secures livelihoods for many communities and indigenous peoples [5].

On an international level, in this regard, there are several key frameworks which, since the beginning of the last century, promote the importance of the good governance of natural

resources—such as the two framework conventions on biodiversity and climate change [6]—and more recent action programmes such as the 2030 Agenda and its 17 Sustainable Development Goals [7], proposed by the Paris Agreement [8]. An initiative proposed by the World Conservation Union [9] also aims to provide a methodological framework (i.e., natural resource governance framework) useful for assessing and strengthening natural resource governance, applicable to different contexts and spatial scales.

Despite the presence of programmes and policies on a global scale, the governance of natural resources continues to be weak, due to several factors such as the lack of co-creation and active participation of different social and economic actors in decision-making processes or problems related to the transparency of these processes. It is therefore necessary to develop appropriate and participatory strategies and provide tools to support natural resource governance processes. According to the FAO [10], the results of such planning should meet the requirements of environmental, social, and economic sustainability.

### *1.2. Strategies for Natural Resources*

There are several strategies that can be leveraged to conserve, protect, and enhance natural resources. These include ecological strategies, which are based on the management and planning of the resource and its services, such as biodiversity conservation [11], restoration interventions in tropical rural landscapes [12] and forest landscape restoration [13]; social strategies, which are based for example on networking between stakeholders, such as interagency and civil society cooperation for wildfire management [14] or business networks for wood products industries [15]; economic and market strategies, which are useful for accounting for natural resources, analysing innovation in industrial processes and products, and attributing an economic value to goods that generally do not have a price, such as the valuation of natural capital and its services [16] or industrial process innovation in forestry [17]; and, finally, political strategies, aimed at adopting programmes and plans on different spatial scales and raising awareness among civil societies, such as wetland implementation policies [18] or awareness-raising on river water pollution [19].

At the same time, it is important to bear in mind that the era in which we live is very challenging and fast-changing, which is why we are inclined to think and make decisions that have a short-term value, because the risk of failure is high. In such an environment, which Warren and Nanus [20] defined as volatile, uncertain, complex, and ambiguous (V.U.C.A.), it is therefore necessary to be able to adopt strategies that are agile and flexible to change, and it is important to know how to choose methods capable of supporting the implementation and modification of such strategies.

### *1.3. Multicriteria Decision Analysis and Its Classifications*

In the complexity of choices, multicriteria decision analysis (MCDA) is useful in providing solutions to decision making problems [21,22]. It speeds up and makes decision-making more transparent, reduces risk and uncertainty, and is easy to use. MCDA consists of several methods, which can evaluate both qualitative and quantitative criteria and measure noneconomic criteria [23]—unlike cost–benefit analysis. It can address problems of a continuous nature and thus allow for infinite alternatives and choice criteria, adopting a probabilistic approach, and falling under the category of multi-objective decision analysis (MODA), or it can deal with problems of a discrete nature, with a finite number of alternatives, adopting a deterministic approach and falling under the category of multi-attribute decision analysis (MADA). In the case of MODA, Danila [24] defines four types of analysis that can help decision-maker(s):

- Selection: the best alternative is chosen from a small number of satisfactory alternatives;
- Sorting: alternatives are assigned to predefined categories;
- Ranking: alternatives are placed in descending order of preference, from best to worst;
- Description: the main characteristics of the alternatives are identified.

The solution methods that can be used in solving complex problems can be divided into three broad categories, as proposed by Bottero et al. [25]:

- Compensating methods: High and low criteria values compensate each other. This category includes the analytic hierarchy process (AHP, [26]), the analytic network process (ANP, [27]), and simple additive weighting (SAW, [28]).
- Non-compensatory methods: Judgements are strongly influenced by limiting criteria. This category includes the lexicographic method [29], the subjunctive and disjunctive methods [30], and the dominant method [31].
- Partially compensatory methods: Criteria with high value can only partially compensate those with low value. This category includes ELECTRE (elimination et choix traduisant la realité) [32], PROMETHEE (preference ranking organization method for enrichment evaluations) [33] and TOPSIS (technique for order of preference by similarity to ideal solution) [34].

MCDA methods, following Vanderpooten [35], can also be classified according to how decision preferences are taken into account: methods based on multi-attribute utility theory (MAUT) that attempt to optimise a value function that aggregates the different criteria taken into account (e.g., ELECTRE and PROMETHEE); outranking methods that are based on outclassing—and thus on the degree of dominance of one criterion or on alternative over the other (e.g., ANP and SAW); interactive methods that rely on several iterative cycles between the software calculation and dialogue with decision-maker(s) to arrive at a final preference.

In this context of natural resource governance and MCDA methods, it was decided to apply AHP, a method belonging to the MADA category, based on the choice and optimisation of the value function and compensatory type, with the intention of investigating the following research question and testing the related hypotheses:

(RQ) What factors can be useful in enhancing the resource and stimulating supply chains with greater added value?

- (H1) Several environmental, social, and economic factors contribute to the evaluation of the natural resource.
- (H2) Factors related to the resource have little leverage on governance strategies.
- (H3) Factors to the external environment have good leverage on governance strategies.
- (H4) Economic factors are prioritised to trigger new governance strategies.

The study aimed to explore, by means of a survey, the factors considered to be a priority by experts for the valorisation of a local natural resource in a V.U.C.A. context. The AHP method was chosen because it is widely used for decisions concerning natural resources [36–38], because it can be combined with other qualitative methods, such as the SWOT [39,40], and because it is easy to understand even for nonexperts [41]. Furthermore, the use of MCDA, and specifically the AHP method, makes it possible to better address the V.U.C.A. context. This work combines the AHP methodology with a previous SWOT study [42] carried out in a similar context, resulting in a qualitative–quantitative study that falls under the A'WOT scheme.

## 2. Materials and Methods

### *2.1. Case Study*

The study area is located in the Piedmont Region, in north-western Italy. The natural resource under evaluation is the chestnut forest, with the objective of valorising its supply chains, excluding the fruit sector because it is already widely valued. In Piedmont, the forest area is about 38% of the territory (1 million hectares out of 2.5 million) and 16.8% of it is occupied by chestnut groves (163,639 ha) [43]. The chestnut is a forest species that grows between 500 and 1000 m above sea level and strongly characterised Piedmont's hills and mountains in the past, due to its wide versatility of use [44]. Nowadays, the resource is readily available [45] and civil society are very much aware of its uses and potentials [46]. However, apart from fruit, the only dynamic supply chains are tannin [42] and, marginally,

those for structural timber. In this context, in order to support the valorisation of chestnut supply chains, it is crucial that decision-making processes also consider the various environmental, social, economic, and political factors, both internal, i.e., its strengths and weaknesses, and external, such as opportunities and threats.

### *2.2. A'WOT*

The A'WOT, first proposed by Kurttila et al. [47], is a hybrid methodology that combines the qualitative analysis derived from the SWOT matrix [48,49] with the quantitative, weighted, and consistent judgements proposed by the AHP multicriteria analysis technique [50,51]. The results obtained are measurable and allow prioritisation of the intervention factors identified in the SWOT [52]. In this work, SWOT factors were taken from a previous study conducted by Bruzzese et al. [42] on the valorisation of the chestnut wood resource in the Italian context. The outcome of the study was a SWOT matrix compiled thorough the literature review of relevant articles and reports.

Methods based on pairwise comparison demand a high level of cognitive effort on the part of evaluators, making these techniques difficult to implement when many factors are considered together [53,54]. Therefore, whenever possible, factors to be included in the study were merged based on similarities and grouping nested items. The aim was to reduce the number of factors by organising them into categories covering economic, social, and environmental dimensions. The factors used for AHP are presented in Table 1; 6 factors were found for internal SWOT factors (strengths and weaknesses) and 4 factors each for external ones (opportunities and threats).

**Table 1.** SWOT matrix.

| Criteria | Factors |
|---|---|
| Strengths | S1. Good availability of the resource |
| | S2. Provision of ecosystem services (cultural and protection) |
| | S3. Richness of wood assortments |
| | S4. Chestnut tradition of use |
| | S5. Vocational training initiatives |
| | S6. Generational change of forest entrepreneurs |
| Weaknesses | W1. Negative stumpage value |
| | W2. Land pathology and orographic context |
| | W3. Weakly harmonised forest management |
| | W4. Old machinery and poor support for innovation in processing companies |
| | W5. Technological defects of wood |
| | W6. Modest public support for the provision of ecosystem services |
| Opportunities | O1. Chestnut research projects |
| | O2. Business networks |
| | O3. Forest certification and quality labels |
| | O4. Raising civil society's awareness of ecosystem services |
| Threats | T1. Climate change, pests, and diseases |
| | T2. Depopulation of mountain areas |
| | T3. Lack of market knowledge and strong foreign competition |
| | T4. Weak granting of subsidies and incentives for the forest wood sector |

The AHP technique was developed by T.L. Saaty with the aim of solving real-life decision-making problems using mathematical models [55]. This technique is structured in the following steps:

1. Identification of the goal/problem to be achieved or solved and its breakdown into sub-elements that are easier to understand. In the case of the A'WOT, these sub-elements are the SWOT criteria and the relative factors of each criterion (Figure 1).

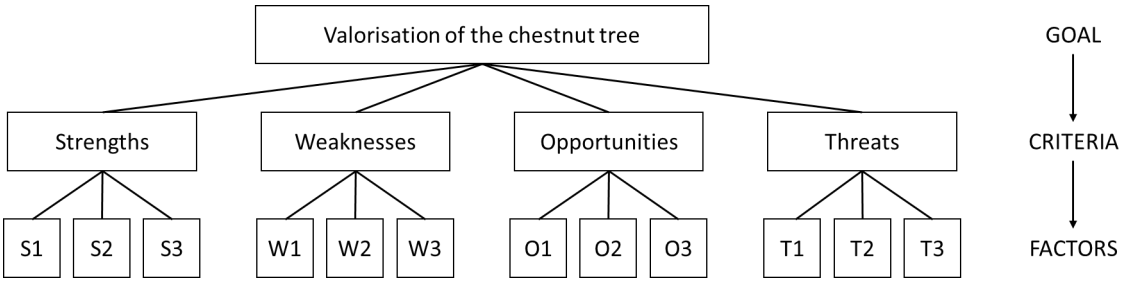


**Figure 1.** AHP structure.

2. Pairwise comparisons of factors, by respondents, for the respective criteria identified. The number of pairwise comparisons is based on a combination and depends on the number of factors (m) present (Equation (1)).

$$\frac{M\,(m\ -\ 1)}{2} \tag{1}$$

The scale used for rating the pairwise comparisons range from $n = 1$ to $n = 9$ and was created by Saaty (Table 3).

3. Creation of a square matrix (Table 2), the so-called pairwise comparison matrix, in which the value of cell (j,i) is the reciprocal of that of cell (I,j). The values in the matrix correspond to the judgements expressed by the respondent. If the value of the ith cell is greater than 1, this factor is preferred over its respective value in the jth cell. The diagonal, on the other hand, has cell values equal to 1. This matrix is made for each group of factors compared and the values are then returned in aggregate form with the judgements of all respondents.
4. Identification of the principal eigenvalue ($\lambda_{max}$) and the normalised principal eigenvector, also referred to as the priority vector. The latter corresponds to the weights of the individual factors under evaluation and is first derived by obtaining the sum of the individual columns of the pairwise comparison matrix. Then, the matrix values are normalised by dividing the individual cell value by that of the corresponding column sum. Finally, the average of the row sum of the normalised values will return the eigenvector. The eigenvalue, on the other hand, is obtained by summing the normalised principal eigenvector, multiplied by the respective column sums.
5. Analysis of the consistency of the judgements through the creation of the consistency index (CI, Equation (2)). Since the judgements are subjective, the technique tolerates up to a certain threshold value of inconsistency. If the consistency index fails, the judgements are inconsistent, and the evaluation questionnaire must be reformulated and pairwise comparisons repeated.

$$CI = (\lambda_{max} - n)/(n - 1) \tag{2}$$

where $\lambda_{max}$ is the principal eigenvalue and n is the size of the pairwise comparison matrix.

**Table 2.** Example of square matrix for a criterion.

| Strengths | S1 | S2 | S3 | S4 | S5 | S6 |
|---|---|---|---|---|---|---|
| S1 | $c_{1,1}$ | $c_{2,1}$ | $c_{3,1}$ | $c_{4,1}$ | $c_{5,1}$ | $c_{6,1}$ |
| S2 | $c_{1,2}$ | 1 | 1/5 | 1/9 | 7 | 6 |
| S3 | $c_{1,3}$ | 5 | 1 | 2 | 3 | 1/7 |
| S4 | $c_{1,4}$ | 9½2 | 1 | 9 | 1/6 | |
| S5 | $c_{1,5}$ | 1/7 | 1/3 | 1/9 | 1 | 3 |
| S6 | $c_{1,6}$ | 1/6 | 7 | 6 | 1/3 | 1 |

**Table 3.** Saaty's scale.

| Value | Value Judgement |
|---|---|
| 1 | Equally important |
| 3 | Moderately important |
| 5 | Strongly important |
| 7 | Very strongly important |
| 9 | Extremely important |
| 2, 4, 6, 8 | Intermediate values |

The resulting value of the CI is then divided by a random consistency index (RI), proposed by Saaty (Table 4), to obtain the consistency ratio (CR). The n of the RI corresponds to the size of the pairwise comparison matrix.

**Table 4.** Random consistency index.

| n | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| RI | 0 | 0 | 0.58 | 0.9 | 1.12 | 1.24 | 1.32 | 1.41 | 1.45 | 1.49 |

If the CR value is less than or equal to 10%, the ratings are acceptable and can be considered for the evaluation.

6. Local priorities are obtained from the weights of the different factors. These priorities are then multiplied by the weight of the relevant criterion to obtain the overall priorities.

### *2.3. Data Collection*

To ensure that the results were robust and reliable, the research was conducted by interviewing a panel of experts on the chestnut resource. The sampling method used was the snowball technique [56], which made it possible to broaden the collection of opinions of various chestnut-related stakeholders: these included a group of 7 representative experts (associations and policymakers); a group of 7 working-level experts (managers and technicians); a group of 4 research experts (research centres); and a group of 2 industry experts. The survey was conducted from July 2021 to June 2022. The AHP questionnaire was distributed via e-mail, accompanied by a description of the SWOT factors and a guideline for completing the questionnaire (Supplementary Material). Of the 36 questionnaires distributed, 20 were completed, validated, and used for processing. The AHP questionnaire was distributed in two stages: the first to obtain local priorities (factor weight); the second to obtain global priorities (criteria weight).

## 3. Results

Table 5 presents the priorities of the SWOT criteria and factors at local and global level for the valorisation of the chestnut wood resource. The analysis shows that opportunities (31.2%) are the criteria considered most important by stakeholders, followed by threats (25.3%), weaknesses (22.6%), and strengths (20.8%). Opportunities should therefore be sought, and their strategies improved, since this criterion is recognised as being 1.5 times more important than that of strengths for the valorisation of the resource (0.312/0.208 = 1.5). At the same time, it is important to point out that stakeholders assign greater importance to external factors (opportunities and threats) of the resource, for which they have no control, than to internal factors for potential chestnut recovery. The consistency ratio value of 0.03 < 0.1 indicates that the obtained judgements are robust and can therefore be considered in decision-making processes.

**Table 5.** Local and global priorities of the SWOT factors. The priority criterion and the priority factors of each criterion are underlined.

| SWOT Criteria | Criteria Priority | SWOT Factors | CR * | Priority of Local Factors | Ranking of Local Factors | Priority Global Factors | Ranking of Global Factors |
|---|---|---|---|---|---|---|---|
| Strengths | 0.208 | S1. Good resource availability | 0.007 | 0.082 | 6 | 0.017 | 15 |
| | | S2. Provision of ecosystem services (cultural and protection) | | 0.155 | 4 | 0.032 | 10 |
| | | S3. Richness of wood assortments | | 0.116 | 5 | 0.024 | 12 |
| | | S4. Tradition of chestnut use | | 0.214 | 2 | 0.045 | 8 |
| | | S5. Vocational training initiatives | | 0.226 | 1 | 0.047 | 7 |
| | | S6. Generational change of forest entrepreneurs | | 0.207 | 3 | 0.043 | 9 |
| Weaknesses | 0.226 | W1. Negative stumpage value | 0.008 | 0.138 | 4 | 0.031 | 11 |
| | | W2. Land pathology and orographic context | | 0.079 | 6 | 0.018 | 14 |
| | | W3. Weakly harmonised forest management | | 0.192 | 2 | 0.043 | 9 |
| | | W4. Old machinery and poor support for innovation in processors | | 0.307 | 1 | 0.069 | 4 |
| | | W5. Technological defects of wood | | 0.097 | 5 | 0.022 | 13 |
| | | W6. Modest public support for the provision of ecosystem services (PES) | | 0.188 | 3 | 0.042 | 10 |
| Opportunities | 0.312 | O1. Chestnut research projects | 0.005 | 0.278 | 2 | 0.087 | 2 |
| | | O2. Business networks | | 0.152 | 4 | 0.047 | 7 |
| | | O3. Forest certification and quality labels | | 0.213 | 3 | 0.066 | 5 |
| | | O4. Increasing civil society's awareness of ecosystem services | | 0.357 | 1 | 0.111 | 1 |
| Threats | 0.253 | T1. Climate change, pests and diseases | 0.015 | 0.177 | 4 | 0.045 | 8 |
| | | T2. Depopulation of mountain areas | | 0.314 | 1 | 0.079 | 3 |
| | | T3. Lack of market knowledge and strong foreign competition | | 0.204 | 3 | 0.052 | 6 |
| | | T4. Weak granting of subsidies and incentives for the forest-wood sector | | 0.304 | 2 | 0.077 | 4 |

* CR: consistency ratio. The CR of the comparisons between four SWOT groups was 0.030.

At the local level, the main opportunity lies in the recognition of civil society's role in participatory decision-making processes and the importance, therefore, of its "awareness of ecosystem services" (35.7%) as an opportunity to enhance the resource. It is interesting to note, immediately afterwards, the importance attributed to research in chestnut-related projects (27.8%). Both factors were recognised as 2.35 and 1.83 times more important than "business networks" (15.2%), respectively.

"Depopulation of mountain areas" (31.4%) was recognised as the main threat factor to be addressed. The liveability and security of these areas depend on their active management and their abandonment could have repercussions on scales beyond the local level. The second factor considered most important to tackle, in order to reduce threats, is the "weak granting of subsidies and incentives for the forest-wood sector" (30.4%), probably one of the main triggers for the abandonment of forest cultivation in mountainous areas and consequently the depopulation of such areas. These factors were recognised as 1.77 and 1.72 times more important than "climate change, pests and diseases" (17.7%), respectively.

The main weakness is represented by "old machinery and poor support for innovation in processors" (30.7%) and the need, therefore, to make technological investments to obtain more effective, efficient, and economical processes for transforming raw material into semi-finished or finished products. Subsequently, a "weakly harmonised forest management" (19.2%) both between the public and private spheres and at a spatial level, from the company scale to the territorial scale, was recognised as the second weakness factor to be addressed. It is also interesting to note that one of the main forestry problems in Piedmont, i.e., excessive land fragmentation, was considered the least important weakness factor, and that the first two factors were identified as 3.89 and 2.43 times more important and priority than it, respectively.

Among the strengths were the importance of "vocational training initiatives" (22.6%) and the success of lifelong learning strategies to have staff and technicians ready for the needs demanded by the forestry sector today. The strong know-how and "tradition of chestnut use" (21.4%) in the past were acknowledged as the second strongest factor on which to act to enhance the resource. Here again, it is interesting to note that the factor of "good resource availability" of chestnut trees in Piedmont, being the first forest category by surface area, was identified as the least important factor on which to leverage and it was, respectively, 2.76 and 2.61 times lower than the first and second factors.

Globally, two opportunity factors emerge as the most important—respectively, "increasing civil society's awareness of ecosystem services" (11.1%) and "chestnut research projects" (8.7%)—and one threat, namely "depopulation of mountain areas" (7.9%). This supports the consideration that factors on which the next chestnut enhancement strategies should focus are external to the resource, while the least important factors on which to intervene are the historical ones, such as "technological defects of wood" (2.2%), "land pathology and orographic context" (1.8%), and "good resource availability" (1.7%).

## 4. Discussion

In this study, we addressed the analysis of the factors to be used as levers to increase the sustainable access and value of wood resources, focusing on chestnut supply chains. Traditionally, most of the concern in forest resource management has been placed on the internal factors to be looked at in decision making, assuming that the external environment is more stable [57]. In this sense, to enhance the chestnut wood chain, the strengths and weaknesses of the production system have generally been considered the main factors to be tackled through appropriate management practices [58,59]. Conversely, the experts involved in our study placed greater importance on the external environment, that is, on factors outside the agency of wood supply chain actors and beyond their direct influence. Opportunities and threats were weighted as priorities, showing that, in particular, social patterns, demographic trends, government policies, and macro-scale environmental changes can drive the appropriate management of chestnut resources.

The usual strategies stemming from the analysis of the external environment are based on leveraging opportunities and minimizing or avoiding threats [60]. However, since the external environment is largely beyond the control of resource managers and sector operators, opportunities and threats must be managed using strengths and weaknesses [61]. Accordingly, strategy decisions can be designed using two main approaches: converting and matching [62]. Converting entails to turn unfavourable factors into strategic advantages and transforming threats into strengths or opportunities. Matching aims allow for gaining a competitive advantage by pairing opportunities to strengths [63]. Based on the results of the prioritization, in the first instance, the process should be carried out focusing on the most relevant external factors. From this perspective, the scope of action for conversion strategies seems to be limited. The two main threats, i.e., "depopulation of mountain areas" and "weak granting of subsidies and incentives for the forest-wood sector", are way beyond the possibilities of action by means of current strengths and are compounded by the effects of most of the weaknesses. However, an external development strategy could be addressed using the two main strengths to gain an advantage on the global market and turn foreign competition into an opportunity. Investing in enhancing the synergy between the "tradition of chestnut use" and "vocational training initiatives" could play a strategic role [64]. Traditional knowledge, skills, and practices, combined with new training activities, could steer production and marketing towards innovative processes and products [65]. Such process has the potential to convert competition from foreign standard assortments into an advantage based on supply differentiation (e.g., switching from marketing raw and semi-finished wood to labelled finished products with higher added value). In terms of matching, efforts could be oriented towards growth-based strategies, allocating scarce public support on actions aimed at boosting the effect of top-ranked strengths linked to most important opportunities. In this regard, training

activities for forest entrepreneurs, operators, and technicians seem to be a key factor in improving resource utilization and gaining competitive advantage. Considering the paired favourable factors, training activities should go beyond traditional technical skills to include the management and valorisation of nonmarket goods (i.e., ecosystem services) and related communication and marketing skills, in order to take advantage of the "raising civil society's awareness of ecosystem services" [66,67]. Furthermore, effective training programs could benefit from linking training design with the dissemination, networking, and learning actions included in most national and European chestnut research projects.

This approach could, however, raise some feasibility issues that should be carefully considered. In particular, leveraging opportunities is often contingent on the availability of financial resources. Although the threat of "weak subsidies and incentives for the forest wood sector" was not ranked as a priority, enhancing strengths would require targeted public support.

## 5. Conclusions

Natural resource management is increasingly becoming a concern for today's technicians, policymakers, and society. In fact, the need to manage resources without irreversibly damaging natural capital has become common knowledge, and said management needs to be sustainable to allow future generations to enjoy common and public goods at least as much as current generations. Therefore, there is an obligation to identify decision support tools that are shared among the various actors in the system, including civil society. These tools enable decision-makers to understand what priority lines are identified by stakeholders with different interests and to support them in their choices.

This study assessed the adaptability of one of these decision support tools (AHP) to a real-world case of managing the chestnut forest resource to identify and order the factors useful to enhance the resource and stimulate the supply chains to achieve greater added value.

The results express a clear stakeholder interest that identifies the significant role of civil society in directing management choices for the provision and enhancement of ecosystem and vocational services. At the same time, intrinsic limits to the development of the supply chain emerge: on the one hand, the poor management of resources, due to the depopulation of rural areas and the consequent reduction of forest exploitation activities; on the other hand, the technological gap of the primary wood processing industry, where technology is often obsolete and inadequate to respond to large-scale market pressures.

In a general sense, the methodological potential emerged to replicate or improve the research in other geographical regions, whether national or extra-regional, or even on a larger scale, such as on a national level. However, the typical limitation of these studies is confirmed: they require the commitment and interest of various stakeholders and, therefore, need to involve all actors, both social and economic (institutions, civil society, and businesses), in order to implement targeted and concrete policies, and sometimes it is not easy to communicate the importance of participatory paths to achieve shared forms of management, especially if this is conducted on a territorial scale, which is too large.

In addition, the AHP method suffers from a certain limitation of factors to be compared in pairs. As they increase, the size of the questionnaire and the cognitive effort in compiling it increase, with the risk of drop-out rates, incorrect answers or bias on the part of the respondents. However, 6 factors to be compared (i.e., 15 comparisons) seem to be a still acceptable compromise. Finally, the method is compensatory, as it averages the respondents' judgements, even if some of them returned the maximum or the minimum score in comparison, it could hide the magnitude of some limiting factors. These technical limitations are unavoidable in the application of the method, while gaining the commitment and interest of stakeholders and motivating them to actively participate in decision-making processes can be crucial task to tackle in order to improve the validity results.

Our study revealed that it is difficult to involve stakeholders early on in the decision-making process and that it is difficult to communicate a general sense of ownership and responsibility for the research project and future policy direction.

To overcome these difficulties, similar studies will need to engage in effective communication, i.e., communicate with stakeholders in a clear, timely, and effective manner, using tools and language appropriate to their experience and needs. Similarly, the active and continuous involvement of stakeholders during the decision-making process is necessary, providing opportunities for them to participate, express their opinions and contribute to decisions. Transparency about the decisions made and processes used is another key factor, so that stakeholders can understand how decisions were made and why.

These are just some of the suggestions that can be useful in gaining the commitment and interest of stakeholders and motivating them to participate in decision-making processes. However, it is important to adapt these approaches to the specific needs of the different contexts and stakeholders involved.

In view of the above, on the one hand, the wide availability of methodologies that can be applied to support the management of natural resources emerges, on the other hand, the lack of scientific studies of real case studies to support resource management and especially forest management is evident. This research therefore stands as a pioneering case for this type of application by addressing the known difficulties of participatory stakeholder inclusion in policy-making processes.

**Supplementary Materials:** The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/resources12030040/s1, Document S1. AHP Questionnaire; Document S2. Guide to filling in the AHP Questionnaire; Document S3. Description of SWOT Factors.

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