Cultural Landscape Planning in Austria: Transfer of Scientific Knowledge to Selected Target Groups by Applying the Analytic Hierarchy Process

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Kulturlandschaftsplanung in Österreich: Wissenstransfer an ausgewählte Zielgruppen durch Anwendung des Analytischen Hierarchieprozesses

1. Introduction

State-sponsored research can be considered a key driver of sustainable environmental, social and economic development. In recognition of this fact, the Austrian Federal Ministry of Science set up (in 1995) the ongoing "Sustainable Cultural Landscape Development" research (CLR) pro-gramme. Since its inception, this programme has been addressing current socio-economic and ecological issues in regional development and using applied research to find solutions to practical development problems (BUNDESMIN-ISTERIUM FÜR WISSENSCHAFT, FORSCHUNG UND KUNST, 1995). Inter- and transdisciplinary scientific co-operation, joint financing of projects by the state and private sectors,

Zusammenfassung

Der folgende Artikel gibt zunächst einen kurzen Überblick über die Kulturlandschaftsforschung in Österreich und der zugrunde liegenden Zielsetzungen dieses Programms. Der Artikel geht weiters darauf ein, wie im Rahmen dieses Programms die Forschungsergebnisse in konkrete Anwendungen übergeführt werden sollen (Wissenstransfer). Das Hauptgewicht liegt in diesem Zusammenhang bei einem spezifischen Selektionsprozess: Wie können aus der großen Anzahl der Forschungserkenntnisse, die im Rahmen des Kulturlandschaftsprogramms generiert wurden, jene ausgewählt werden, aus denen konkrete Anwendungen abgeleitet und vermarktbare Produkte entwickelt werden können? Diese Frage betrifft die Kernaufgabe des Wissenstransfers: Wie können wissenschaftliche Erkenntnisse besser zu praxisrelevanten Anwendungen transformiert werden und wie können diese Anwendungen besser vermarktet werden? Unter Vermarktung wird dabei die Identifikation von Zielgruppen, die Entwicklung von Produkten, die eine Problemlösung für diese Zielgruppen darstellen und die Einführung dieser Produkte durch die Nutzung von Marketing-techniken verstanden.

Schlagworte: Wissenstransfer, Entscheidungsunterstützung, Regionalmarketing, Analytischer Hierarchieprozess, Kulturlandschaft.

Summary

The following paper gives a brief overview of the Austrian cultural landscape research programme and its underlying objectives. The paper also takes a conceptual look at how the programme intends to manage the implementation of research results in practical applications – the aim is to see genuine utilisation of research outcomes. Particular attention is given to the process by which products for development and marketing are to be selected from the huge range of research outcomes generated in the programme. This concerns the core issues of research marketing: How can scientific knowledge be better applied to real problems and how can this knowledge be best marketed. Marketing means identification of target groups, development of products which offer solutions to problems faced by target groups, and introduction of these products to the target groups through the use of appropriate marketing techniques.

Keywords: Knowledge Transfer, Decision Support System, Regional Marketing, Analytic Hierarchy Process, Cultural Landscape.

and international research co-operation ensures the targeted and effective use of public money for this research.

If such solution-orientated research is to be able to respond and adapt to a dynamic research environment, then public debate, discussion and exchange of ideas and experience is required. This must involve all the participants in the innovation process, irrespective of background, be this politics, science, business, planning, media, education or art. Ideas and concepts drawn from non-profit marketing, given appropriate modification and application, can improve the success of the CLR programme by encouraging knowledge transfer between research groups and target practitioner groups, and by building trust between these different groups through ongoing dialogue (KOTLER and ROBERTO, 1989).

This paper describes the special characteristics of the Austrian CLR programme. The programme differs from previous national research initiatives in terms of its origins, organisation, research approaches and research objectives. The main part of the paper shows how the Analytic Hierarchic Process can be applied to choose the best suitable one for marketing out of a variety of research results.

In brief the key issue of this paper is: Faced with a wide range of detailed research results, how can we draw out specific research products intended for practical implementation (using an systematic and analytic decision making process; BAZERMANN, 1998, 3)?

2. The Austrian "Sustainable Cultural Landscape Development" Research Programme – a brief overview

As in many other developed countries, a lot of Austria's regions are subject to ecological exploitation, migration away from disadvantaged areas and increased traffic burdens. Conflicting pressures and demands are placed on land units and all these socio-economic factors are themselves associated with environmental problems, such as pollution or overexploitation of soil and groundwater, and a rapid reduction in the number of animal and plant species. The aim of the "Sustainable Cultural Landscape Development" research programme is, therefore, to produce the necessary scientific basis for new development approaches which might help turn the promising, theoretical concept of sustainability into practical reality at a regional level.

The research programme takes sustainable development to mean one which respects both society and the environ-

ment, and which ensures that current and future generations can benefit from a secure supply of basic resources. In this context, the normative element is of central importance; people and societies set objectives, not nature. It is, therefore, important to identify the risks associated with particular scenarios, so that alternatives can be considered. An understanding of the (political, socio-economic and cultural) dynamics and decision-making processes behind observed development processes is also important. The challenge for science is to find quantitative and objective indicators which allow the continuous observation of social and environmental development processes. Alternative approaches to the resolution of conflicts also need to be identified. These approaches must reflect the need to treat the environment with care and respect, but they must also take into account the needs of the people involved.

The framework of the research is defined through the following programme objectives (see BUNDESMINISTERIUM FÜR WISSENSCHAFT, FORSCHUNG UND KUNST, 1995):
- a meaningful reduction in those material flows caused by human activity,
- preservation of biodiversity and quality of life,
- resolution of any conflicts arising from the first two objectives,
- encouragement of a diversity of development and lifestyle alternatives within the dynamics of the landscape.

The set of tasks implied within these objectives is related to the conflict between the core concepts of "quality of life" and "biodiversity". *Quality of life* is taken to mean the sum of both individual and collective evaluations and aesthetic perceptions of immediate circumstances (in the context of environment, work, leisure time, home and family). The meaning of *biodiversity* is that proposed within the "Convention on Biological Diversity": the preservation of biological diversity, the sustainable use of its components, and the fair and balanced distribution of benefits arising from exploitation of genetic resources, for example through provision of reasonable access to genetic resources and the appropriate distribution of resulting technologies (with due consideration to the rights associated with these resources and technologies), or through appropriate funding.

Issues concerning the sustainable use of Austrian cultural landscapes cannot be resolved by any one, single socio-economic or scientific discipline. Regional and local populations also need to be closely involved in the research process. The kinds of projects most likely to be found in the programme, therefore, are those which demand a considerable degree of inter-disciplinary co-operation, which counter-

balance top-down and bottom-up approaches and which seem most likely to produce the kind of research results which can find relatively swift practical application.

Since the beginning of 1995, around 180 scientists from 30 disciplines have been working closely with local people in order to find approaches to land use which reflect the needs of both society and the environment. The programme currently covers 20 modules (sets of inter-disciplinary projects), involving a range of – often very innovative – research methods and approaches. The following objectives are covered:

- describe and secure social and ecological functions
- develop and evaluate strategies for resolving conflicts of use (in the sense of research on behalf of the weaker parties in such conflicts)
- ensure quality of life and a secure supply of basic resources for local populations while giving due consideration to the needs of society and the environment (the problems, needs, wishes and priorities of the local population are at the core of this process)
- secure and restore the multifunctionality of the cultural landscape
- secure (1) the supply of biotic and abiotic resources (e.g. through the optimal use of renewable resources) and (2) those landscape areas and elements of importance in terms of landscape ecology or cultural genetics
- introduce or improve planning instruments for open spaces
- give emphasis to border regions (meaning both internal and outer EU borders)
- control implementation and development processes
- ensure that research results are capable of practical implementation, particularly in the areas of research, politics, planning and education
- provide scientific supervision of the programme (research into the research process itself)
- ensure research results can be used in legislation and public administration, and as catalysts for the introduction of independent control and development structures

These research objectives are a clear reflection of the research programme's pragmatic approach and clear focus on implementation issues. Increasing the knowledge base per se rarely solves problems. Instead, environmental research has to examine the relationships between theoretical knowledge and practical action. It has to take up the position within the problem-solving process where new insights can bring about the greatest impact. Public relations (PR) and media work must not, therefore, be seen as

a communication process of secondary importance to the research itself. On the contrary, such work should be seen as an integral component of programme-specific marketing initiatives, allowing environmental research results to be converted into tailor-made solutions to actual problems (BUNDESMINISTERIUM FÜR WISSENSCHAFT UND VERKEHR, 1998).

3. The potential for increasing the effectiveness of cultural landscape research (CLR)

Research marketing is not just a process for communicating research results to relevant target groups. It also serves to ensure that cultural landscape research is given an appropriate strategic position in national and international innovation systems. Contract research projects with environmental themes generally have relatively small budgets. Nevertheless, continual dialogue with the main players in the innovation system (such as politicians, businessmen and finance experts) can draw wider financial and human resources into the programme, and make a decisive difference to the issue of implementation (research programme as catalyst).

One problem, however, is that science is generally not something that arouses much public interest. Scientists tend to accumulate new knowledge slowly, use neutral language, and offer long-winded explanations. This contrasts with the more general needs of potential users of scientific information, who seek clarity and simple, problem-orientated, practical guidelines for dealing with the issues and problems they face. If science becomes more closely associated with the problems of daily life, then it might also become more interesting for society, particularly for decision makers in politics, planning and business. The cultural landscape research programme also aims to increase public awareness and acceptance of both science and scientific institutions by tackling environmental problems that concern us all (BUNDESMINISTERIUM FÜR WISSENSCHAFT UND VERKEHR, 1998).

If you are to gain and hold the attention of a significant proportion of society and establish the kind of contacts needed to ensure the efficiency and relevance of a research programme, then you have to put a lot of work into ongoing communication activities. If resources are limited, then PR work has to concentrate on specific target groups. Media work can then be extended systematically to tackle new targets as resources permit. Up until now, formal communica-

tion within the CLR programme has mainly been limited to production of an information bulletin for distribution to funding bodies and participating and non-participating scientists. Thanks to a fundamental shift within Austrian scientific policy toward more professional supervision of research, it is now possible to follow new directions, in particular through the creation of a programme-specific marketing concept (identification of the most relevant target groups and appropriate ways of approaching these groups, definition of the most important scientific products). In this respect it is important to note that general non-profit marketing aspects are not the issue of this paper. The main aim of this paper refers to solving of a specific multi-criteria decision problem. Nevertheless, the following chapters give a brief and general overview about non-profit marketing and target group selection.

4. Marketing Concepts for CLR Results

4.1 General Aspects

The CLR outcomes should be communicated to potential beneficiaries. We can describe this as *marketing for scientific results*, which means we need to develop marketing concepts for marketable products. Concerning the development of marketing concepts we focused on traditional marketing literature (e.g. DIBB et al., 1997; MACDONALD, 1996; LANG, 2000) with the four main steps

1. analysis,
2. strategy formulation,
3. implementation,
4. control.

In this context, marketable products mean research insights and results which offer genuine solutions for problems of potential target groups. We would, for example, have a product of considerable value to landscape planners, local administrators, ecologists, etc., if we were able to collate and incorporate those sustainability indicators which have been developed in the programme within a user-friendly application. Products are individual solutions which allow practical application of scientific knowledge in terms of, for example, action guidelines, decision support systems, expert software, catalogues of measures and methods, videos, exhibitions, etc.

"Marketing" generally means the satisfaction of all kinds of customer needs (KOTLER, 1997, 9). The main difference between traditional marketing and non-profit marketing is the non-profit orientation of the latter concept. Instead of profit goals there are different strategic objectives like the protection of ecological systems, the achievement of social welfare or – like in our case – the maintenance of cultural landscapes (SCHEUCH, 1997, 213; KOTLER and ROBERTO, 1991, 37pp.).

Knowledge transfer would become more effective and target-orientated given appropriate presentation and marketing of scientific results and insights to potential users (i.e. those who can make use of research results in their political, economic or planning activities). It is certainly not enough simply to refer to research papers for the scientific community. More specifically, we need *marketing strategies* that account for both the needs of the target groups, and the nature and objectives of cultural landscape research.

4.2 Target groups

Compared to traditional marketing there are no one-dimensional exchange relations (with other words no seller-buyer relations) because there are more forces influencing the non-profit market (media, governmental institutions, trade unions, etc.). Therefore, each non-profit organisation has one core task: to identify the individual interest groups (i.e. stakeholders) and their basic wishes and needs and their political objectives (SCHEUCH, 1993, 542pp.). The potential stakeholders for the scientific results out of the CLR program are:
- communal players (mayors, clubs and associations, CLR and regional development initiatives, other "landscape protagonists")
- political decision makers at local, regional and national levels
- decision makers within the economy (commercial and industrial landscape users, regional managers, planning offices, etc.)
- interest groups and representative bodies (trade unions, chambers of commerce, etc.)
- associations and NGOs active in environmental and landscape protection
- national and international experts in CLR-related scientific and research disciplines,
- educational institutions (schools, universities, etc.)

5. Analytic Hierarchy Process (AHP) as a Method to Select CLR Products

In our case, marketing concepts were developed (following an examination of the current situation) for 3 products chosen to act as role models. These marketing concepts take into account the special nature of non-profit marketing and innovation marketing. Therefore, the aim of the product selection was to identify "CLR-prototypes" best suitable for marketing.

Discussions with potential beneficiaries and the CLR-scientists ran in tandem with research, in order to ensure a continuous exchange of information between researchers, practitioners and the "CLR Marketing"-project team. This dialogue allowed us to identify and eliminate useless initiatives at an early stage and made product development for target groups easier.

5.1 Rationale for the Use of AHP

Why do we use a decision support system? WIERENGA et al. (1999, 197) showed that decision support systems "… can increase firm profit and other measures of performance". Furthermore, the use of decision support systems ensures that selection of research products for marketing is transparent and comprehensible.

The computer-based Analytic Hierarchy Process (AHP) seems suited to the selection process covered in this paper:
1. AHP is one of the few methods where hard (e.g. sales) and soft (e.g. brand image) facts can be combined. According to MINGERS (2000, 673) the combination of hard (quantitative) and soft (qualitative) information within a decision support system is often required.
2. AHP is a method which is easy and flexible to use. This is one of the main requirements for the selection of the appropriate method, because in our case practitioners have to make use of the decision support system. Therefore their willingness to work with a decision support system was mandatory. The main reason why decision support systems are not used by practitioners are: "… not simple enough or to difficult to understand …" (LITTLE, 1970; cit. in WIERENGA and VAN BRUGGEN, 1997, 34).

Other reasons why we used AHP for solving this decision problem were (SAATY, 1995, 25): AHP provides a single solution, flexible model and is easy to understand; AHP leads to an overall estimate of the desirability of each alternative; problem definition and judgements can be refined during the process; linear thinking is not required; AHP can deal with the interdependence of elements in a system; AHP enables tradeoffs, which are often necessary to take a decision. In particular, a number of specific applications of AHP have shown that this method can be very useful in solving poorly structured, complex decision problems, e.g. economics and planning, energy (policies and allocation of resources), health, conflict resolution, material handling, and purchasing, etc. (ZAHEDI, 1986, 100).

AHP uses objective criteria to ensure that selection decisions are both transparent and easy to follow (SAATY, 1995). Poorly-defined problems (in this case, selection of three alternatives out of a wide range of possible product alternatives) are expressed within a hierarchical structure, allowing us to follow an objective decision-making process; put simply, this approach allows us to get a ranking of several alternatives.

5.2 Procedure of AHP

"AHP enables decision makers to visually structure a complex problem in the form of a hierarchy. Each factor and alternative can be identified and evaluated with respect to other related factors" (DYER and FORMAN, 1991, 115). In general, AHP consists of the following steps:
1. definition of a specific decision making problem,
2. formulation of relevant criteria, which can be taken to structure the decision making process and selection of available alternatives (i.e. the decision hierarchy),
3. pairwise comparison to weigh the criteria,
4. pairwise comparison to weigh the alternatives in view of each criterion,
5. synthesis of weights/priorities on the basis of a matrix calculation combining the weighting of criteria/alternatives,
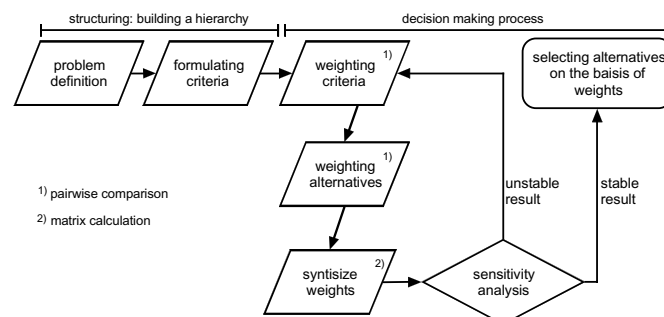

Figure 1:   Analytic Hierarchy Process
Abbildung 1: Analytischer Hierarchieprozess

6. sensitivity analysis to determine how sensitive the final alternative priorities are to changes in the criteria weights,
7. selecting alternatives with highest weights/priorities (DYER and FORMAN, 1991, 106).

Steps 1 to 7 can be illustrated as shown above whereby step 1 and 2 concern the structuring within AHP and step 3 to 7 concern the decision making process.

5.3 Formulation of CLR Decision Hierarchy

The problem which we were faced with is: How can we reduce the huge number of research results within CLR in order to develop "CLR-prototypes"? We are talking about 30 possible products for which marketing concepts could have been developed.

To solve this decision problem, a number of relevant criteria were selected. In a first step we used the criteria "readiness of research results for knowledge transfer" and "realisability" to reduce the 30 research outcomes to a maintainable number of possible products (AHP requires a maximum number of 9 alternatives for pairwise comparison).

In a second step we selected further criteria to finally evaluate the remaining alternatives. These criteria were deduced by analysing marketing and decision theory literature (KOTLER, 1997; KOTLER and ROBERTO, 1989; HAMMOND, 1999; MACDONALD, 1997; LUCK, 1989; BAZERMAN, 1998), by qualitatively interviewing experts of non-profit marketing and of cultural landscape researchers. The resulting criteria were combined within an AHP model (see figure 1). This model can then be used to define a product typology, categorise individual research results in terms of different levels of (implementation) priority, and select (objectively) those products to be marketed.

Criteria for selecting these products were
• accessibility of target group(s);
• developing costs (i.e. the financial resources required for implementation);
• positive image transfer from the product to the whole research program, i.e. CLR (public relations);
• availability of sufficient final results (readiness for production);
• unique selling proposition of the expected products (USP; KOTLER, 1997, 296);
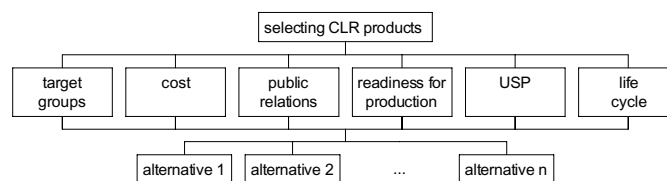• expected life cycle of the product.

Figure 2:   CLR decision hierarchy
Abbildung 2: KLF Entscheidungshierarchie

Only such a strict, well-defined approach to the selection of products can guarantee that the best-suited results will be transformed into specific products for practical application. This efficiency-driven approach is particularly important when you consider that the legitimacy of original research depends on the utilisation of the end results (at least in applied research).

The actual selection of these criteria and the following weightings (of criteria and alternatives), were carried out by the following decision group: representatives of the Federal Ministry of Science, cultural landscape experts, potential users of research results, the scientific supervisory committee for the project, researchers of the University of Agricultural Sciences Vienna. This was to ensure that a maximal amount of knowledge and experience was incorporated within the decision process.
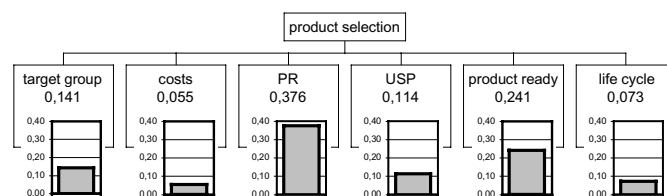

Figure 3:   Evaluation of criteria / criteria priorities
Abbildung 3: Evaluierung der Kriterien / Kriteriengewichtung

Figure 2 shows the results of the judgements by these persons concerning the criteria of the process. It shows that the criterion "public relations" is by far the most important one followed by "readiness for production" and "target group". Therefore, the deciders can be considered to be more aware of the public impression of the products than of technical aspects. Obviously, the subjective benefit orientation of the deciders has a large influence on the outcomes of such an evaluation process. But subjectivity within a decision process comes along with the insights of the decision theory (LAUX, 1998, 59; WEBER, 1993, 10).

5.4 Evaluation of CLR Alternatives

As mentioned above, out of the huge number of possible products eight alternatives were selected for evaluation within AHP (i.e. product favourites). As you can learn from table 1, the range of products varies from services to software and training facilities.

Table 1:   CLR product favourites (alternatives)
Tabelle 1: KLF Produktfavoriten (Alternativen)

	abbreviation AHP	description
Alternative 1	internet	website CLR
Alternative 2	seminar	seminars for cultural land scape planners, governmental decision makers etc.
Alternative 3	sim-klf	training software containing scenarios of cultural land-scape development (simulation game)
Alternative 4	info-sys	information system landscape planning Lower Austria
Alternative 5	gem-bros	information brochure for villages
Alternative 6	exp-sys	expert system for risk evaluation of alpine surfaces
Alternative 7	röb	laws and guidelines concerning CLR
Alternative 8	plan-sof	evaluation model for ecological projects

Based on pairwise comparisons taken by the decision group mentioned above, AHP extracted the following preliminary ranking of alternatives (see figure 3).
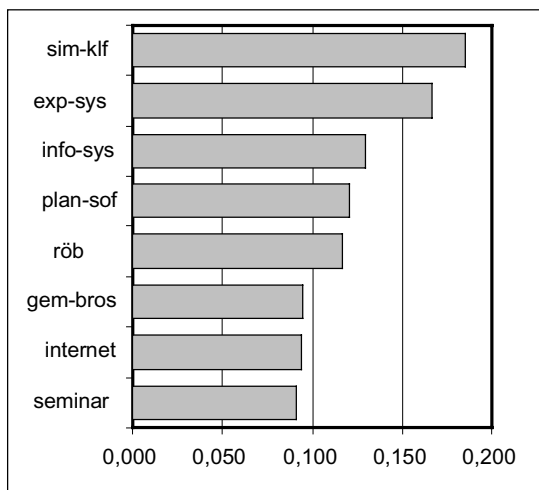

Figure 4:   First ranking of the alternatives
Abbildung 4: Erste Rangreihung der Alternativen

This ranking is preliminary because AHP requires the application of a sensitivity analysis in order to prove the stability of the ranking.

5.5 Sensitivity Analysis

"It is often desirable to test the responsiveness or sensitivity of the outcome of a decision to changes in the priorities of the major criteria … What one does is to change the priority of that criterion keeping the proportions of the priorities for the other criteria the same …" (SAATY, 1995, 140). In our case, the sensitivity analysis showed that this ranking has to be over thought, especially because the alternative "seminar" got much higher weighting if the criteria "USP" or the criteria "target group" were considered to be more important.
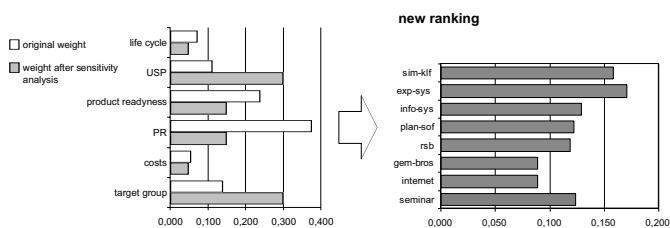

Figure 5:   Sensitivity analysis
Abbildung 5: Sensitivitätsanalyse

Based on this sensitivity analysis, the group chose three alternatives for the development of marketing concepts:

1. **sim-klf:** a simulation game software containing scenarios of cultural landscape development in order to teach students the implications of measures taken by humans in the cultural landscape,
2. **seminar:** seminars for cultural landscape planners, governmental decision makers, etc. to give them an idea of the requirements deriving from CLR
3. **exp-sys:** an expert system for risk evaluation of alpine surfaces for the prevention of avalanches, mudflows and comparable negative implications deriving from human activity in alpine regions.

The change in the ranking of the alternatives was a result of the discussion process within the decision group. It is a good example for the necessity of an iterative decision process. Although the ranking changed completely after the sensitivity analysis, the outcomes of the group decision were

satisfying for all group members, especially because the group got some better insights into the decision problem. Under these conditions, it is often necessary to accept changes in the results of an evaluation process. The main aim, the selection of alternatives for the development of marketing concepts, can nevertheless be considered to be achieved.

6. Perspectives

6.1 Marketing Concepts

For these three alternatives marketing concepts were developed. Each concept is a detailed description on how scientific outcomes should be transferred into marketable products. The concepts consist of (MACDONALD, 1996; DIBB et al., 1997):
- product description,
- market segmentation and selection of target group(s),
- 4 P's of marketing (price, production, promotion, place),
- time schedule,
- required budgets for product development,
- market analysis: strength/weakness – risk/benefit analysis.

6.2 Implementation of the Marketing Concepts

The implementation of the marketing concepts will be the next step. Through this knowledge transfer can be considered to be completed. Institutions and individuals participating in the CLR programme will receive feedback and advisory support. This is to ensure that the actual implementation of marketing concepts takes account of the insights and experience gained during their development. An evaluation of the implementation process will help us identify potential for improving efficiency and effectiveness. A comparison of the objectives which initially led to the establishment of the research initiative with the outcome of the actual implementation of the research products (within the context of evaluation) will also provide information which can be used to improve future calls for research proposals.

7. Conclusion

The problematic development of the cultural landscape in Danube and Alpine areas (traffic, tourism, pollution, agriculture, nature conservation, etc.) was the starting point of the research focus initiated by the Austrian Federal Ministry of Science (in brief FMS). Therefore, the FMS decided to grant funds (more than 10 Mio US$) to finance studies in the field of sustainable development. Actually, a lot of studies in the field of various research disciplines were finished (e.g.: Sociology, Landscape Ecology, Geography, Political Sciences, Economics, History, Landscape Planning, etc.). Unfortunately, it has not been considered that potential users are probably not able to make use of these research results. Potential users could be political decision makers, governmental institutions, interest groups/Non Governmental Organizations (NGOs, especially environmental groups), economic protagonists, schools and universities. To reach them with the results of Cultural Landscapes it is necessary to *develop individual strategies for the marketing of the relevant applications*. The applied method to select the most useful projects for transformation to concrete products was the Analytic Hierarchy Process (AHP). Originally, it was designed to solve complex decision making problems. In our case three research results were selected for further marketing. First: A simulation game software should teach students interactively the implications of measures taken by humans in the cultural landscape. Second: Training seminars for cultural landscape planners, governmental decision makers etc. to teach them soft skills like project management, negotiation skills, moderation and presentation techniques referring to CLR. Third: An expert system for risk evaluation of alpine surfaces for the prevention of avalanches, mudflows and comparable negative implications deriving from human activities in alpine regions.

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