# Development Scenarios of Sustainability for Golf: The Algarve Case

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## Abstract

Golf is becoming a major industry worldwide. The majority of the Portuguese golf courses are located in the Algarve region. Golf tourism has a great economic impact on the Algarve and is regarded by local tourism developers as a vehicle for tackling the seasonal patterns of "mass tourism". In consideration of the concerns of those involved in regional tourism and golf, the University of Algarve has developed a prospective study on the sustainability paths of this activity, starting from an integrated analysis of reference conditions of golf in the Algarve, with respect to environmental, economic and social dimensions.

 In this paper we present the sustainability assessment framework developed in this study and the results from its application to the Algarve's golf courses through the definition and evaluation of three alternative development scenarios and their associated impacts. The application of economic, social and environmental indicators was a key tool for the construction of the "baseline", "moderate" and "intensive scenarios". It was concluded that the development of further golf activity in the Algarve should be framed within high service and environmental quality standards. The sustainability area for golf course development should vary between 29 and 41 gold courses (equivalent of 18 holes).

## 1. Introduction

The golf industry is experiencing growth worldwide. The number of affiliated golf players is estimated at around 60 million and the number of golf courses exceeds 31,600 (Portuguese Golf Federation, 2003). In Portugal there exist 55 golf courses and more than 12,000 registered golfers (Portuguese Golf Federation, 2002). The largest share of Portuguese golf courses is located in the Algarve region.

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Regarded by tourism developers as a vehicle for overcoming the seasonal patterns of "mass tourism", this activity has a great economic impact in the Algarve region (University of Algarve, 2003). In 2002, more than 200,000 golfers visited the Algarve, which represented over 900,000 rounds sold (University of Algarve, 2003). The average daily expenditure of a golf tourist that year was estimated at € 175.36, which is almost double the average expenditure of a "regular" tourist (€91.78). (University of Algarve, 2003).

The mix of old golf courses and the increasing number of new golf projects, combined with the emergence of more and more environmental pressures are raising awareness among managers (Videira *et al.*, 2004). Given the concerns of the regional tourism and golf authorities, the University of Algarve (2003) has developed a prospective study – "Algarve Golf Study" - on the sustainability paths of the golf industry in this Portuguese region. This study was based on an integrated analysis of the reference conditions of golf in the Algarve, with respect to environmental, economic and social dimensions.

In this paper we present the results from the evaluation of development scenarios for the golf activity against three dimensions of analysis: environment, business and regional economy. Considering these areas of impact, a sustainability assessment framework was defined for the positioning of the regional performance of golf courses in a sustainability triangle. This qualitative analysis was supported by the quantitative definition of indicators addressing the key environmental, business and regional economy aspects for golf in the Algarve (Videira, *et al*, 2004).

In section 2 we review the existing literature on this theme, in section 3 we review the sustainability assessment framework developed for the evaluation of the alternative development scenarios for the golf. Section 4 presents the three scenarios and their underlying variables. The results from the simulation of the golf impact indicators in each scenario are discussed in Section 5. The final section presents the main conclusions and possible development paths for golf in the Algarve.

## 2. Literature Review

Improving the environmental performance of golf courses may be facilitated through the adoption and implementation of several voluntary instruments. These may be divided into two categories: Environmental Management Systems (EMS) and Environmental Management Programs (EMP). Examples of EMS include the ISO 14001 standard, and the Eco-Management and Audit Scheme (EMAS), whereas Audubon Cooperative Sanctuary Program (ACSP), Committed to Green and Green Globe 21 fall into the EMP category. The implementation of these environmental performance instruments offers many generic benefits for any organization, and in particularly for golf clubs (Partidário & Lima, 2002).

The ISO 14001 standard, first published in 1996, may be applied to all types and sizes of organizations. It provides the elements of an efficient and continuous environment management system that can be integrated with other requirements of management, in order to help organizations to reach environmental and economic objectives (ISO,

1996). In the cases where the golf course is part of a larger tourist resort, the boundaries of the EMS implementation are dependent upon the organization goals and their technical and economic capacity. The EMAS is a regulation of the European Commission (EC 761/2001 of 19 March 2001). The ACSP for golf courses has been the leading program in the United States of America to provide comprehensive environmental education and conservation assistance to golf course managers and the industry (Audubon International Institute, 2003). The Committed to Green is a pan-European EMP for golf facilities that was developed by the Unit of Ecology of European Golf Association, following the guidelines developed by Audubon International. The targets of this program are the existing golf courses, the new golf course projects and also the major golf events (Stubbs, 1997; EGA, 1999). Green Globe constitutes an environmental management and awareness program, developed by the World Travel & Tourism Council. Its requirements have been established in accordance with the principles of Agenda 21, and the principles for sustainable development. The major goal of Green Globe is the promotion and implementation of the Agenda 21 principles in the travel and tourism industry, by supporting affiliated companies in the improvement of their environmental management practices (Green Globe, 2003).

Environmental Performance Evaluation (EPE) is an internal management process designed to provide management with reliable and verifiable information, on an ongoing basis, to determine whether an organization's environmental performance is meeting the criteria set by the managers (ISO, 1999).

The definition of environmental indicators represents an essential tool for the operationalization of EPE in an organization. In this context, an environmental indicator consists of a specific expression that provides information about the environmental performance of an organization (ISO, 1999). In a broader sense, indicators may be defined as parameters, or combinations of parameters, which are selected due to their ability to reflect the conditions of the systems being studied (usually they are used after a preliminary treatment of the original data using simple arithmetic or statistical operations) (DGA, 2000).

The Organization for Economic Cooperation and Development (OECD) has proposed a conceptual model describing different types of indicators (OECD, 1993). This framework distinguishes between Pressure, State and Response indicators (P-S-R model) (DGA, 2000; OECD, 1993) (Videira et all, 2004).The EEA extended this approach by presenting the "D-P-S-I-R model", which extends the OECD framework by considering additional indicators for the Driving Forces (underlying needs which trigger human activities) and Impacts (effects of pressures on human health, ecosystems and materials) (EEA, 1999).

The analysis of efficiency/profitability in the tourist industry is restricted to a small number of papers. Baker and Riley (1994) suggest the use of ratios to analyse the performance of the lodging industry. Wejeysinghe (1993) suggests the use of break-even analysis to analyse the profitability of tourism management. Brotherton and Mooney (1992) and Donaghy et al (1995) suggest yield management to analyse the efficiency of hotel management. Morey

and Ditman (1995) analyse the efficiency of 54 hotels with DEA and Bell and Morey (1995) analyse 31 Travel departments with DEA estimating the efficiency ratios. With up-to-date methods, Anderson et al. (2000) analyse the efficiency of 48 hotels and estimate the allocative and technical efficiency using cross section data on prices, inputs and outputs. In a related paper Anderson et al. (1999) analyse the efficiency of 48 hotels for the year 1994 with an econometric stochastic translog frontier.

Specifically on golf, from a business perspective, no studies of a scientific nature were found. From the economic perspective, The *Patronato Turismo de Costa del Sol* (2002) reflects the economic worries of the tourist economy of the Costa del Sol. This analyses the golf situation in the region and relates it to the changes of supply and demand in Malaga, pointing out its economic and social weight. Also, Stynes, D. J., Sun, Y. and Talhelm, D. R. (2001) contribute to the analysis of the golf economy, studying visitors in Michigan. By examining primary data, they compare the perceptions of the supply and demand sides quantifying the economic result of this activity for the region. Melvin (2000) applies techniques to the hedonic prices of Rosen (1974) on the services offered by 17,000 golf courses in the United States between the years of 1995 and 1997. He concludes that with the correlation of 100 variables used, it is possible to fairly accurately estimate the prices of goods and services transacted at a golf course and its composite characteristics, which confirms that golf is not a product endowed with usefulness in it, but it is these characteristics that give it its usefulness. Golf represents, by itself, an important economic activity and simultaneously induces other activities, principally those of a tourist undertaking – other constructions around its periphery. Martinez (1992) lists the sub-sectors of the economy related to golf – productive, employment, real estate, the holding of golf tournaments and golf tourism. The author affirms that the interconnection provokes a diminution relative to public courses, in favour of private golf courses. He points out the difficulties encountered in some of the new courses constructed in mountainous areas, which seem to contribute to the lowering demand by the golf client, whose average age is above 45 years of age.

This bibliography is clearly short for such an important tourism issue. With this paper we intend to enlarge knowledge of tourism, on its sustainability, and to call the attention of other researchers' to this field of tourism. Our paper departs from the previous literature by using a matrix of impact indicators to characterize and evaluate the sustainability of golf from the business, environmental and regional perspective.


**3. Sustainability Assessment Methodology for Golf in the Algarve**

The methodology is seated on two fundamental areas: the building of scenarios and a strategic evaluation of the sustainability of each of these scenarios.

The scenario, as meant above, constitutes a probable evolution of the golf activity in the Algarve, conditioned by three types of entry data:
- The demand projected on the part of the golfers;

- The supply profile of new courses during the period of analysis;
- The legal aspects at the onset constituted by regulations that condition the location of the courses and the regulations that determine how they operate.

The set of data provides for various possible development trajectories for golf, depending on the projections of economic variables, supply and demand, and also future developments in the legal sector.

The principal problematic fixed variable for golf, at this moment, is found in the legal sector for the entire period. This is not only because some of these regulations are of the European ambit, but also because these areas, dealing with the environment, will have a tendency to become more and more restrictive. The indicators that were used in the evaluation of sustainability are the indicators calculated at the beginning of the diagnosis (cf. Videira et all, 2004; Correia et all, 2004). On the other hand the hypotheses on the evolution of supply and the location of future courses result from the consultation of the processes that are encountered in the phase of getting licenses and permits that officially exist.

The schema below seeks to illustrate the two stages of the building and evaluating of the strategic scenarios.
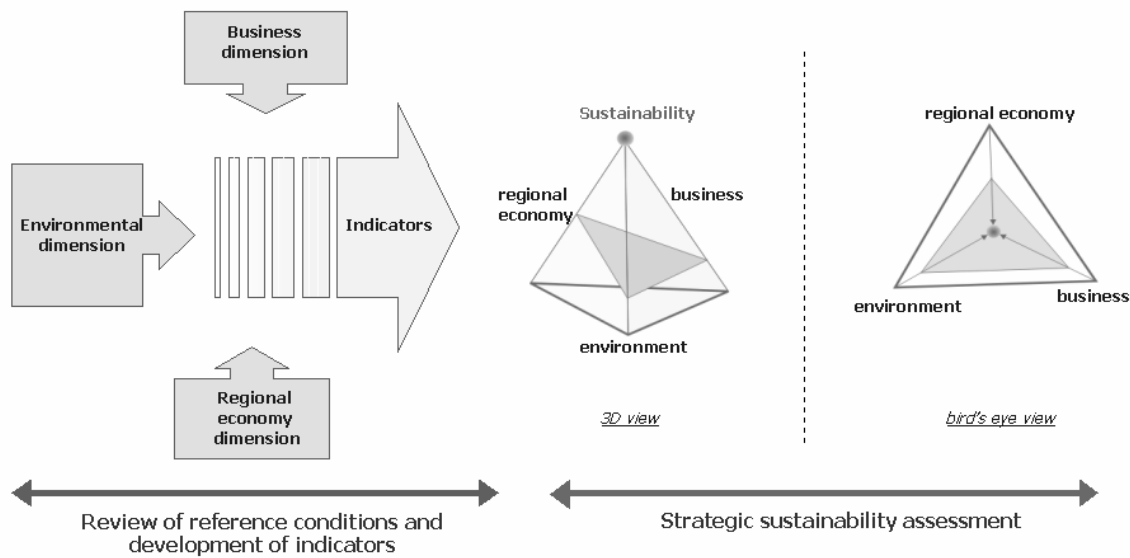


Source: University of Algarve, 2003

**Figure 1** – Framework for the analysis of golf impacts in the Algarve

The strategic sustainability analyis of golf in the Algarve region implies, before all else, that the concept of "sustainable industry" be defined.

A sustainable industry is *simulatneously*:

- Competitive. The competitive capacity of an industry, in this case, is measured by its capacity to maintain a market, generating profit in the medium and long term, and offering hgh quality services

- Environmentally responsible The golf industry may impact natural resources and ecosystem functions through its transformation of land use, the consumption of water, the contamination of soils and aquifers, and through possible effects on biodiversity, landscape and climate. The protection of these natural resources is crucial, for this activity, since their quality and quantity represent a competitive advantage for golf.

- Generating positive social and economic impacts. Golf is tourism and, as such, is within the principal economic activity sector of the Algarve. In this sense, its balanced development can contribute to the generation of a significant impact on the regional product, in employment and in hotel, restaurant and cultural activity, all the more so in that the most intense period of this activity is during that time of the year when there is the lowest tourist flow levels.

- Integrated into regional development. Golf extensively occupies land, and consequently the location of courses is conditioned by the physical disposition of land and its aptitudes and uses. In addition there is the obvious, that the activity induces investments in buildings and acceptable accessibility.

The definition of sustainability in the economic sector is not sufficient for practical purposes. For this reason there is a need to create an approach that allows for the evaluation, if possible, to measure, through its impacts, the contribution of each of the above mentioned domains: business, regional economy and environment. When an industry has positive (non-negative) effects in all of the domains, then we can affirm that its development is, in fact. sustainable.

From the methodological point of view it is necessary to measure, in practical terms, the effects of each scenario in these diverse domains:

- Construct an impact chain of the activity for the mid- and long-term;
- Estimate, with an indicator base, the potential dimension of the impacts whether quantitatively or qualitatively.

The applying indicators will measure the magnitude of these impacts through multipliers of consumption and employment for the economic and regional areas, and through an analysis of average club profitability, and the environmental indicators.

A qualitative comparison of scenarios will be performed, since an aggregation of the effects is not viable due to the differentiated nature of the variables. The synthetic indicator here is the degree of sustainability of each scenario, in the most simple form but also in most elucidative way, by situating each scenario in the so called "triangle" of sustainability, presented in figure 1. The scenario is considered most sustainable, to the extent to which it is most centered in the triangle, which means a greater degree of complementarity and not conflict among competing firms, protection of the environment and regional development..

## 3. Variable Scenarios

The constructing of scenarios for golf is founded on this activity's economic logic, as is the case with any other industry, which is inserted in a competitive supply and demand based market.

The variable that permits a characterization of the supply and demand, is the number of golf rounds per year, at the regional level, or sub-region, and at the level of the course. The price that characterizes the market is the average price per 18-hole round. However, given the actual conditions under which this activity is practiced, this price is not necessarily the over-the-counter price, which differs from course to course but an average, which is derived from these prices, and from the prices implicit in the package deals sold.

The supply of rounds/year depends on the number of courses – the installed capacity – and certain other parameters, which permit the calculation of the maximum number of rounds per year.

The maximum rounds/year needs is the taking into consideration of the estimated theoretical capacity (Universidade do Algarve, 2003) with the economic capacity of courses. By economic capacity we mean the maximum number of rounds that is possible to supply without negatively effecting such criteria as course quality or congestion, and, thus, guaranteeing the profitabity of the business. The growth in supply depends on the price that can be practiced in the market, the pressure of demand, but also, to a great extent, on the legal conditions of the new courses' implantation and location.

This restriction is sufficiently important, to our understanding, so that the supply aspect is decisively conditioned and that the construction of scenarios must wholly consider everything with the legal element as problematically uncertain.

### 3.1 Demand projections

Demand projections for such a long period cannot leave out the consideration of relevant factors such as:

- the effect of the tendency to incorporate elements of player inertia and fidelity;
- the effect of new golf courses that create new market diversity, inducing new players;
- the price effects, resulting from an increase in the number of new players that regularly use nearby golf courses.

Beyond these factors it was assumed the following presuppositions of a qualitative nature:

- That the quality of the supply (present golf courses and future ones) will continue to exhibit an equivalent average quality pattern as those existing presently;
- That the profile of new players will continued to be as defined in the Inquiry, that is: with the same demands of quality and with the same buying power.

Taking into account these factors, evolution of demand (number of rounds/year) was estimated by an econometric model (cf. Annex – Demand, Universidade do Algarve 2003) that led to the following results:

*Projection without significant effect on the supply*

- A growth of demand at an average rate of 1.55% per year between 2003 and 2020

*Projection with an increase of supply*

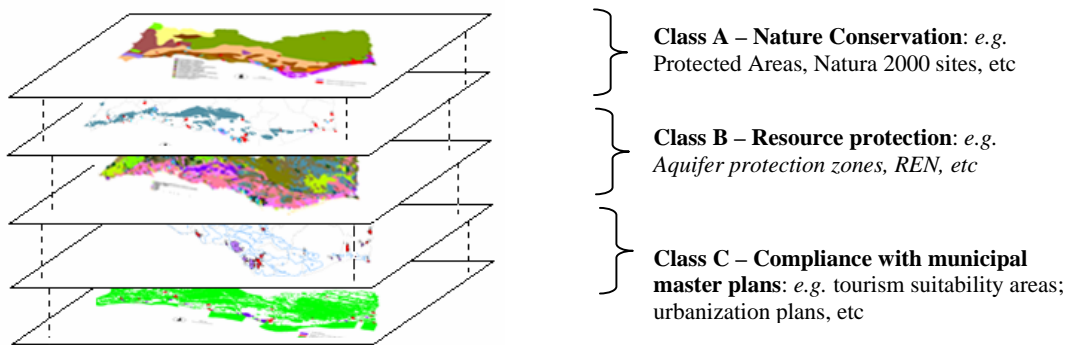- A growth of demand at an aveage annual rate of 1.77% per year between 2003 and 2020

Regarding the evolution of average price per round, resulting from the interaction of demand and supply, it is expected as obvious that the increase in supply would not be favourable to an increase in the real price. However, the maintenance of quality will permit the maintenance of elevated of prices in some segments of the market which are always sensitive to differentiation and the permanence of unique characteristics of some of the courses in the region.

### *3.2 The legal and institutional framework*

The legal and institutional framework for golf development in the Algarve is one of the base elements of the sustainability scenarios, namely through the integration of the golf courses within the existing land use instruments. In order to complement the analysis of golf's supply and demand, a review of the most important legal criteria related with the licensing process of golf courses is necessary.

According to the legislation concerning public use sporting installations (Decree-law no. 317/97, of 25 November 1997), the Algarve's Regional Directorate for the Environment and Land Use (DRAOT-Algarve) is responsible for giving an opinion prior to the location consent for a new golf course. The general criteria followed by this authority for basing its opinion include the compliance of the proposed location with the municipal master plans (PDM) and a favourable Environmental Impact Assessment (EIA) decision. A closer examination of the consent criteria indicated that a positive decision from the DRAOT is also constrained to nature conservation criteria. Thus, the locations overlapping Natura 2000 sites, national protected areas, aquifer protection zones and the National Ecological Reserve (REN) are, in principle, subjected to strong restrictions.

Given these criteria, the authors defined an integrated (although non-exhaustive) classification of restrictions concerning the development consent procedure for golf courses in the Algarve (Figure 3).
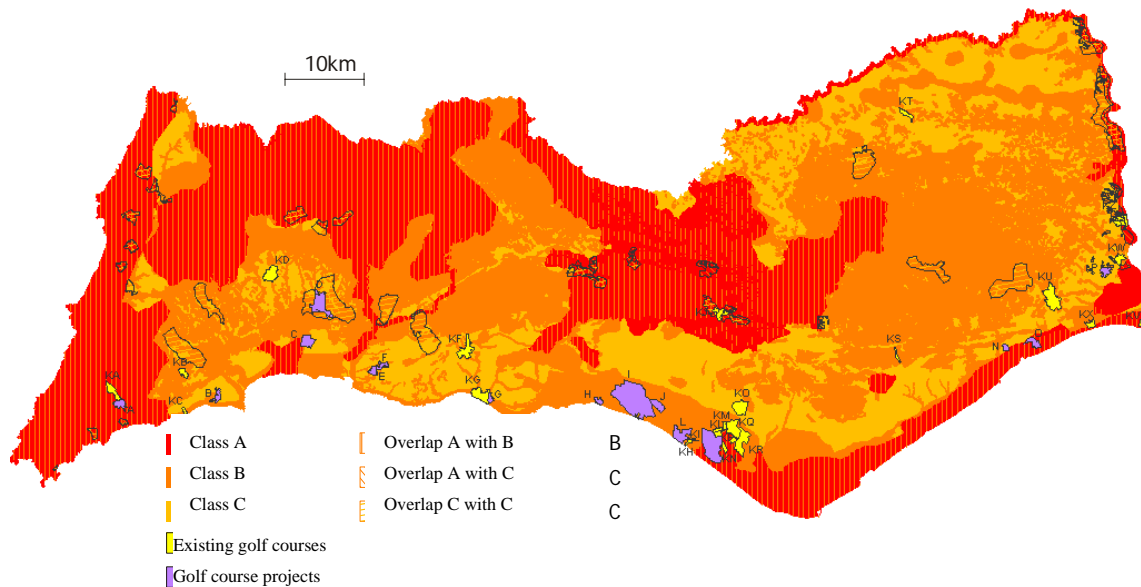


**Class A – Nature Conservation**: *e.g.* Protected Areas, Natura 2000 sites, etc

**Class B – Resource protection**: *e.g. Aquifer protection zones, REN, etc*

**Class C – Compliance with municipal master plans**: *e.g.* tourism suitability areas; urbanization plans, etc

Source: University of Algarve, 2003

**Figure 3 –** Classification of golf course licensing criteria in the Algarve

This methodology was developed using the available geographical information for each of the criteria. The obtained digital maps were assembled with AutoCAD Map, and three types of classes were defined:

- *Class A* – Proposed golf course locations falling within this category overlap (totally or partially) with Natura 2000 sites and/or national protected areas;

- *Class B* – Proposed golf course locations falling within this category do not overlie nature conservation areas but do overlap (totally or partially) with areas designated for the special protection of natural resources such as aquifer protection zones or REN areas;

- *Class C* – Proposed golf course locations falling within this category do not overlap with nature conservation or resource protection areas, and only need to verify the PDM rules and other municipal land planning schemes (*e.g.* urbanization plans or tourism suitability areas).

Considering the available digital information, the application of this methodology to the Algarve is presented in Figure 4.

Legend:
- Class A
- Class B
- Class C
- Existing golf courses
- Golf course projects
- Overlap A with B
- Overlap A with C
- Overlap C with C

*Existing golf courses:* A – Parque da Floresta; B - Boavista; C – Penina (Resort, Academy e Championship); D – Morgado do Reguengo I; E – Quinta do Gramacho; F - Vale da Pinta; G – Salgados; H – Pine Cliffs; I – Lusotur Golfes (Old Course, Millenium; Laguna e Pinhal); J – Vila Sol; L – Vale de Lobo (Royal e Ocean); M – Quinta do Lago (Quinta do Lago, Ria Formosa, Pinheiros Altos e San Lorenzo); N – Benamor; O – Quinta da Ria e Quinta de Cima; P – Castro Marim

*Golf course projects:* KA – Sinceira; KB – Espiche; KC - Montinhos da Luz; KD - Mexilhoeira Grande; KE - Morgado do Reguengo; KF - Quinta da Lameira; KG - Praia Grande; KH - Dunas Douradas; KI – Garrão; KJ - Quinta da Ombria; KL – Muro do Ludo - Pinheiros Altos; KM – Laranjal; KN - Muro do Ludo; KO - Parque das Cidades; KP - Quinta das Navalhas; KQ – Pontal I- UOP 6; KR - Pontal II- UOP 8; KS - Colina da Rosa; KT - Herdade Finca Rodilhas; KU – Sesmarias; KV - Ponta da Areia; KX – Verdelago; KZ - Almada de Ouro; KW - Quinta do Vale

Source: DRAOT-Algarve (1992-2003)

**Figure 4 –** Existing and projected golf courses in relation to the licensing criteria

### 3.3 Supply of new golf courses

The projection of the supply variable in terms of rounds/year, or in terms of new courses, cannot be dissociated from the environmental conditions, as was demonstrated in the last section. For this reason, a look at the manifestations of

intentions to build new courses, in which some permission processes are found at an advanced stage with the public entities, shows that the supply projection obeys the following proceeding:

a)  The consideration of the extreme cases:
- on the minimal end of this continuum would be to project the 2020 supply from the number of courses having received licenses by the end of 2003;
- the maximal end would be to count and consider all on-going licensing petitions and known pretensions as eventually getting approval and the courses being operational by 2020.

b) The consideration of an intermediate situation is to admit that some of those present petitions for licensing will eventually get approval, be built, and be part of a sustainable solution from the environmental, economic and financial perspectives.

Looking at the existing locations and those petitions where there already exists a concrete location (See Figure 4), three working hypotheses are elaborated that constitute many other projections of supply. The supply is measured in equivalent courses (18 holes). The average period considered, from the initial request for licensing of the golf course till it is fully functioning, is between three and four years in the typical processual situation.

*3.4 Development hypothesis*

In the designated baseline reference scenario includes the courses presently in operation, the courses in construction and those whose licenses were predicted to be concluded with approval by the end of 2003. This comprises a total of 32 courses (equivalent to 29 eighteen-hole courses).

In the designated intensive sceanrio there are 91 courses (equivalent to 88 eighteen-hole courses) in this scenario which considers all of the functioning courses and all of the intended courses as approved and running by 2020. This constitutes the extreme case in the easing of restrictions and the implantation of golf courses.

The moderate scenario considers a maximum limit of 44 courses (equivalent to 41 eighteen-hole courses). This includes those courses presently operating, the courses in construction, those whose licensing process consultations show a high probability of approval, and also, whose intentions concerned with location respect the conditions presented on the previously presented map summary.

The distribution of golf course supply for the three hypotheses is presented in  Graph 1.

Graph 1                    Distribution of Functioning Golf Courses for the three scenarios
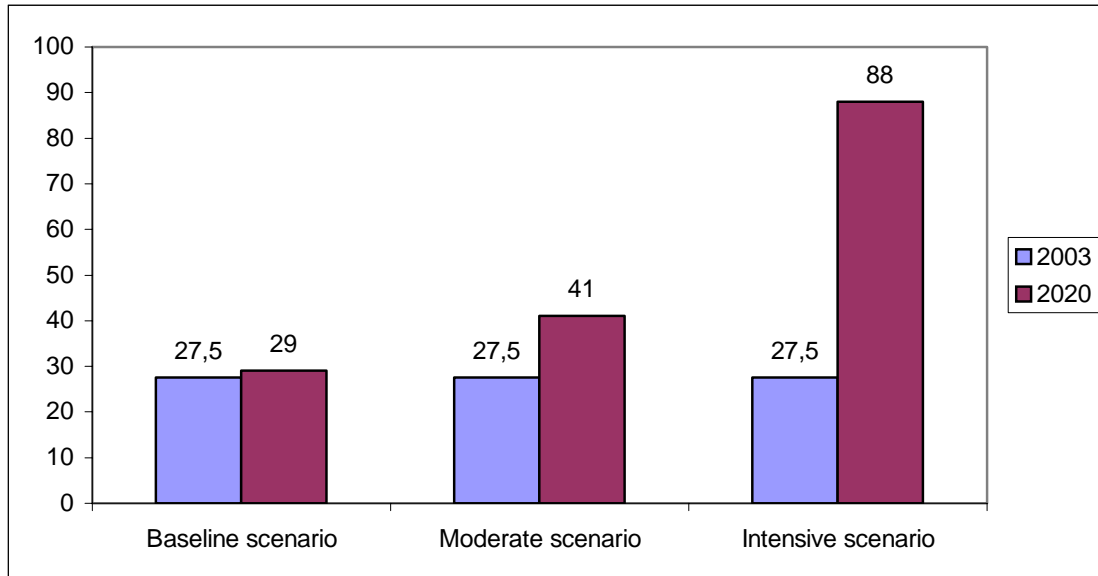
Notice that the moderate scenario is not defined by the optimum number of courses for the Algarve region, but only the maximum number of courses, from the present regulation perspective, that can be built obeying the existing conditional factors.

The optimum number of courses has to do with the set of criteria that includes, besides the minimization from the negative environmental factors, the profitability of the business, the benefits for the region and the conditions of the international market. It will consequently be a solution that is situated between the reference scenario and the moderate scenario.

At this point, and for each scenario, it is proper to confront the evolution of the two magnitudes:

- on the one hand the economic supply from the group of courses that translates, naturally, to the demand desired by the clubs;
- on the other hand, by the effective demand that is equivalent to the projections accomplished.

Graph 2                    Evolution of Supply in the Scenarios
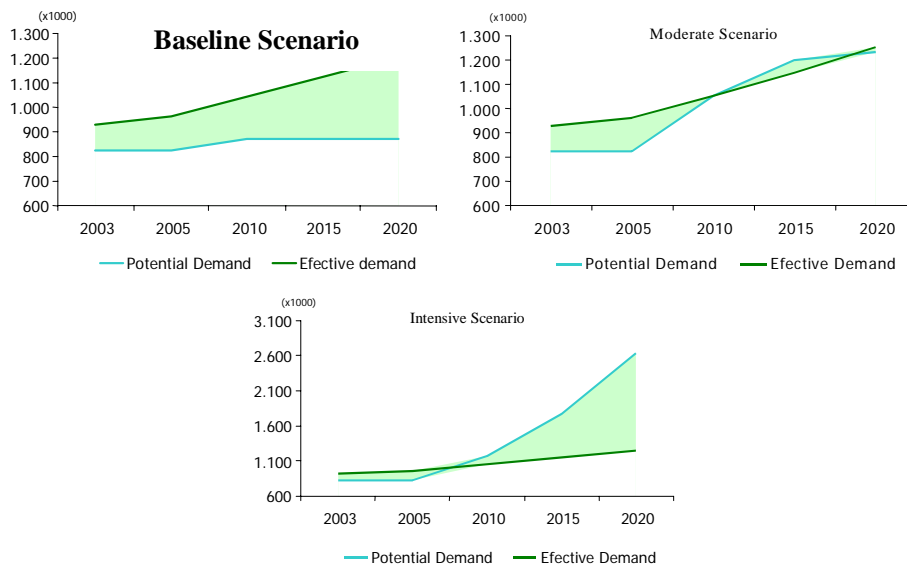


Source: Universidade do Algarve, 2003

The existence of an excessive demand is verified in the reference (baseline) scenario which is already observed in 2003, but which will be aggravated during the entire study period until it will affect approximately 75,000 players in 2020. In 2003 there already existed an effective excess in demand opposed to the norm of 30,000 rounds/year, which meant at this time there are courses that sell numbers of rounds way above the economic supply number established and compatible with *benchmarketing*. An out of balance situation verified is explained because the product supplied is highly differentiated and the difference in prices charged at the various courses is still not important enough to provoke shifts in demand.

The moderate scenario assumes a supply of 41 courses of 18 holes and an effective demand associated with a simple growth tendency of the demand with the increase of courses (an annual growth rate of 1.77%). The projection shows a convergence situation of equilibrium of the golfing market in the Algarve in 2020, respecting the patterns of excellence defined (an average of 30,000 ounds per year per course).

The extreme scenario is massive golf course expansion, which could occur through a total easing of restrictions (88 courses of 18-holes), and would amount to a supply of 2,600,000 rounds per year by the year 2020 which would be capable of accommodating an estimated flux of 586,000 golfers. Even when allowing for the most favourable growth projections for demand (1.77%/year), we obtain 278,000 golfers in the year 2020, resulting in an excessive supply which would, inevitably, have results on the prices and the quota of players at each course. The salient features of this scenario would be the following: a temporary equilibrium would be reached in 2005, with 39 courses in operation. There would then be progressively larger and larger excess in supply, so that by 2020, it would reach

1,800,000 rounds. This would be created by annual supply growth rate of 7.4%, while the annual increase of demand would be at 1.77%.

Graph 3 analyses the projected adjustments in average prices on the courses when confronted with the three scenarios for supply increase.

**Graph 3**                    **Evolution in projected Average Prices for the different scenarios**
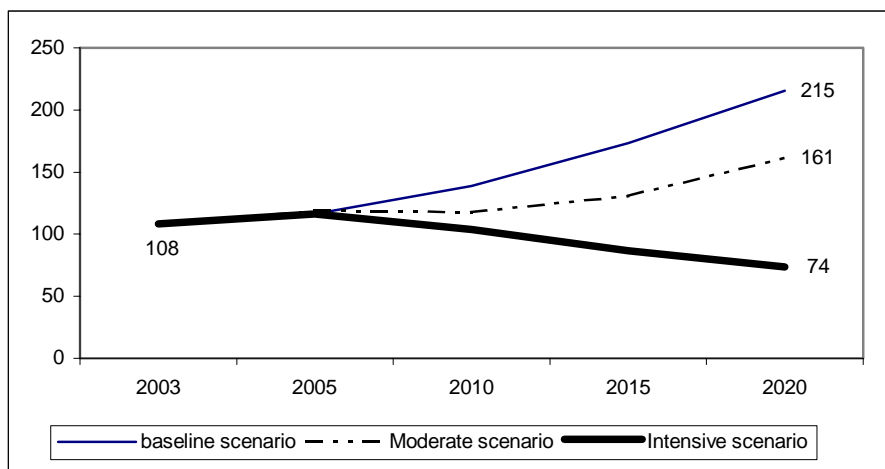


Source: University of Algarve, 2003

For the two scenarios it is possible to identify definite, clear patterns of evolution. The general sense is an increase in prices. In the two scenarios where the pressure of demand determines levels of utilization above the maximum capacity of the courses, the increase is more prominent. The persistence of an excess of demand along the entire period is the primary reason for the rapid increase in prices, especially if we remove this from the criteria of the value of the golf product which does not exclusively depend on the price. By maintaining the present number of courses, the cost of a round of golf could reach a maximum of 215 euros (130 euros at current prices), while with the intensive scenario, a minimum of 74 euros (45 euros at current prices).

A complete easing of the restrictions would cause a general fall in golf prices in the Algarve region. This scenario characterizes the case where the closing-down point functions. The repercussions of lowering prices and revenues received would be fatal to the sustainability of golf course businesses.

**4. Evaluation of the Sustainability Scenarios**

The scenarios elaborated present diverse configurations for the development of golf with very different impacts as well. These calculated indicators from a real observation base or real data assume a positive character, informing us of the intensity and of the direction of impact between these two variables (supply and demand), based on a cause-effect relationship. The direct application of these indicators to the results of the scenarios permits an estimation of the business, the economic, social and environmental impacts for the period within this time-span.

*4.1 The Business perspective*

The indicators of business impact were calculated as a function of the costs and gains determined in the estimated exploitation plan for a course with 18 holes with patterns of high quality.

**Table 1** – Key business indicators for the golf in the Algarve

| Type | Indicators | Units | Value | Reference scenario | Moderate scenario | Massive expansion scenario |
|------|-----------|-------|-------|--------------------|-------------------|----------------------------|
| Economic-Financial | Break-even point | Number of rounds | 17,502 | 17,332 | 17,609 | 17,344 |
| | Minimum average cost | Euros | 42 | 44 | 52 | 57 |
| | Closing-down point | Number of rounds | 7,796 | 10,398 | 13,086 | 14,226 |
| | IRR ( Internal Rate of Return) | % | 12 | 33% | 14% | - |
| | NPV ( Net present value) | Euros | 652,446 | 1,622,868 | 138,989 | -584,176 |
| | Payback | Years | 8 years 3 months | 8 years 5 months | 12 years 4 months | 30 years and 1 month |
| | Cost benefit ratio | Units | 0.92 | 0.99 | 1.00 | 1.00 |
| | Profitability of sales | % | 37 | 44% | 18% | -20% |

Source: University of Algarve, 2003

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The sustainability of the business results from the margin of safety that the companies try to manage to remain in the market. Taking into account that companies aim to maximize profit and that demand possesses a dynamic that limits expansion, there then exists a point at which a state of equilibrium exists, at a price and at a quantity, which does not permit the company to make a profit. In economic theory these effects are designated as the break-even point and the closing-down point. At the break-even point abnormal profits do not exist, that is, a company is found working with a price equal to the average costs. At the closing-down point, the company only covers its variable costs, that is, it works at a loss equal to the fixed costs, which is an unsustainable situation for the mid- and long-term.

The baseline scenario is that which presents the largest margin of security. The courses sell an average of 41,000 rounds where only 17,000 rounds are needed to break-even. This security margin is based on an over utilization of the existing courses, which although it will not lead the courses leaving the market, can mean a departure of clients due to insatisfaction. In the moderate scenario, the courses sell an average of 30,535 rounds/year while the threshold of profitability is situated around 17,609, which means that although the utilization rate has diminished, they are operating at 73% above the point where there is no profit. In the massive expansion scenario the courses will operate at the closing-down threshold, a situation which is not economically sustainable, unless golf becomes a subsidiary of another sector, for example, accommodation.

In terms of economic viability, in the baseline scenario the rate of profitability is 33% after taxes and the value of the cost of opportunity is 5%, which is approximately 1.6 million euros. The moderate scenario generates a *cash flow* of exploitation in the order of 500,000 euros/year, approximately 22% of the average receipts generated. With an internal rate of profitability of 14% after taxes, and a VAL of 138 thousand euros to a rate of 5%, it continues to be a viable and sustainable economic project. The earnings are not so elevated in the moderate scenario, which is possible with course use at 30,000 rounds/year, which permits a high demand but which does not approach saturation. The massive expansion scenario in the 17-year time frame is not economically viable and it would necessitate 30 years of generated receipts for the project to recuperate the investment. Only after 30 years could it be hoped that the 88 courses would become profitable.

In view of the profitability perspective, it is favourable for these companies to maintain an excess of demand, which is good for the short-term. However, if the objective is to maintain a level of quality of the demand, a decrease in the rate of course usage is called for, This also will naturally imply that the receipts would diminish and, consequently, the profitability lowered, but this is the price for a sustainable business.

*4.2 The regional economy perspective*

The analysis of the regional indicators of the project is done through the Gross Value Added (GVA), generated by the activity, and has the purpose of measuring the impact of the project on the growth of the Gross Domestic Product (GDP), on the employment and on the investment. The principle criteria for the evaluation of the economic and

social effects to be measured are: the economic effect; the effect in terms of value added; the effect in terms of employment, and the social effect.

**Table 2** – Key regional economy indicators for the golf in the Algarve

| Type | Indicators | Units | Value | Reference scenario | Moderate scenario | Massive expansion scenario |
|---|---|---|---|---|---|---|
| Economic Effect – Investment | Direct Investment | Euros | 7.5 million | 11.25 million | 101.25 million | 453.75 million |
| | Induced Investment | Euros | 3.5 million | 12.993 million | 49.855 million | 80.535 million |
| Effects in terms of added value ( economic account of the sector) | Gross Value Added (GVA) | $10^6$ Euros | 2.2 million | | | |
| | GVA family | % | 33 | 33 | 33 | 33 |
| | GVA State | % | 29 | 29 | 29 | 29 |
| | GVA Companies | % | 38 | 38 | 38 | 38 |
| Effects in terms of Employment | Employment | Nº | 30 | 870 | 1,230 | 2,640 |
| | Employment participation for the region | % | 6% | 6.5% | 9.1% | 19.6% |
| | Average cost/ employee/course/month | Euros | 1,532 | 1,557 | 1,541 | 1,544 |
| Social Effect | Weight of the courses in GVA of the region | % | 0.07% | 2.8% | 1.9% | 1.1% |
| | Ratio capital/product | Units | 0.3 | 0.41 | 0.2 | 0.05 |
| | Social Internal Rate (SRR) | % | 22% | 63% | 58% | 6% |
| | Ratio capital/employment | Euros | 250,000 | 250,000 | 250,000 | 250,000 |
| | Average productivity | Euros | 75,318 | 103,206 | 83,036 | 47,045 |
| | Distributive effect | % | 44 | 32% | 59% | 27% |

Source: University of Algarve, 2003

The investment in golf courses has an induced effect on both the upstream and downstream sectors, with particular relief in construction and public works: principally in the infrastructure and in the urban development components. The urban effect, of which we are interested, is lodging at hotels. This is the type of lodging that most golfers visiting the Algarve use. The induced investments of greatest relevance are these costs associated with tourist

construction and infrastructure. A golf course can generate an average of 150 new five-star hotel beds. It is estimated that this value of investment can be as much as 11 million euros per golf course.

The GVA generated by the activity permits the measurement of the relative importance of the courses' economic growth for the region. In this way the growth potential of the golf sector is equivalent to the rate of growth of the GVA. The predicted added value is calculated by the difference between the company production value of the goods and services received from other exterior sector entities.

The GVA amounts to 2.2 million euros per golf course and is absorbed in more than 38% by the companies. The GVA grows at a rate of 4,5% in the baseline scenario, much higher than the growth predicted for the demand and the rate of 1.18% in the moderate scenario, below the rate of growth of demand. In the massive expansion scenario the added value is zero in 2010, the date from which the VAB (GVA) assumes growing negative values until 2020. In the reference scenario it is observed that more than 50% of the VAB generated by golf is absorbed by the businesses. The families and the State absorb 18 and 28% respectively. In the moderate scenario, the distribution of the GVA changes in 2020, as a result of the gradual diminution of profits generated by the golf course businesses, which will occur in proportion to their increase in number (in 2003 the existing golf courses absorbed 51% of the GVA and in 2020 they will absorb 31%). In the massive expansion scenario the VAB in 2020 is negative, a reflex of a policy of golf courses operating at the threshold of closing with losses equivalent to the fixed costs. In business this is what we can designate by a "red light" (the point in which the GVA goes into negative territory) which happens in 2010 (with 39 courses).

An average 18-hole golf course employs 30 people. On the regional level golf represents 6% of the employment volume generated by the tourist sector. The employment generated by this activity is of a higher value, in proportion to that of almost all of the economic structure of the region. The creation of associated employment, relative to its stability, constitutes an increasing value of golf for the economic development of the region.

In the Algarve the average cost per employee in tourism is 900 euros/month. In the activity of golf the average cost per employee is 1500 euros, which is approximately 50% above the average. This fact indicates better exploitation conditions and a lower turnover of employees.

The annual GVA of 2.2 million euros means that each golf course contributes to the regional product formation by 0.07%. The baseline scenario is where the largest regional growth is, with an annual GVA of 3 million euros, contributing to a formation of a regional product of 2.8%. The average coefficient of capital product shows that for each unit of capital invested, the social product associated to the project rises 41% in the baseline scenario and 20% in the moderate. In the massive expansion scenario this growth is around 5%. This means that the social benefit is 0.41 times greater than the social cost, in the case of the implantation of 29 courses, 0.2 times greater in the implantation case of 41 courses and 0.05 times for the case of 88 courses.

The social productivity of the investment in the project is measured by the internal social rate and permits the gauging of social profitability of the project of the order of 63% in the reference scenario, 58% in the moderate and close to zero in the massive scenario. In social terms the implantation of 29 or 41 courses results in relatively the same social benefits, in both cases they are significantly higher than the social costs. In the 88 course case, the social cost is very close to the social profit

The implantation of a golf course in social terms is desirable.

*4.3 The environmental perspective*

The environmental aspects analysed in the Algarve Golf Study include the consumption of water for irrigation, the consumption of phytopharmaceutical and fertilizers, energy consumption, waste production, the location of golf courses on land-use instruments and the implementation of environmental practices by the golf clubs.

Table 3 summarizes a selection of the key indicators related with the environmental management aspects of golf. Two alternatives were considered. Alternative 1 consists of the average indicators calculated on an aggregated basis for the Algarve region, reflecting the average and annual conditions for the year 2002. The selected normalization unit for these indicators was the area (in hectares) of the golf courses. Alternative 2 represents a benchmark situation for the average of the five golf courses with the best environmental performance (i.e. those with the lowest values for the developed indicators).

**Table 3** – Key environmental management indicators for golf in the Algarve

| Indicator | Units | Alternative 1 | Alternative 2 |
|---|---|---|---|
| Total water consumption for irrigation | $m^3$/ha | 10,950 | 4,210 |
| Total surface water consumption for irrigation | $m^3$/ha | 1,330 | 203 |
| Total groundwater consumption for irrigation | $m^3$/ha | 8,610 | 3,150 |
| Total domestic water consumption for irrigation | $m^3$/ha | 597 | 0 |
| Total recycled wastewater consumption for irrigation | $m^3$/ha | 411 | 853 |
| Total electricity consumption | kWh/ha | 5,740 | 1,390 |
| Total consumption of phytopharmaceutical products | kg/ha | 7.76 | 3.12 |
| Total consumption of fertilizers | kg/ha | 613 | 159 |
| Total waste production | t/ha | 2.28 | 1.13 |
| Total green waste production | t/ha | 1.81 | 0.545 |

Source: University of Algarve, 2003

The simulation of the environmental indicators for the two alternatives in each of the development scenarios is presented in Table 4. An average golf course area was considered to be about 40 ha.

**Table 4** – Simulation of the key environmental management indicators for golf in the Algarve

| Indicator | Units | Baseline scenario | | Moderate scenario | | Intensive scenario | |
|---|---|---|---|---|---|---|---|
| | | Alt. 1 | *Alt. 2* | Alt. 1 | *Alt. 2* | Alt. 1 | *Alt. 2* |
| Total water consumption for irrigation | hm$^3$ | 12.70 | *4.88* | 17.93 | *6.90* | 38.54 | *14.82* |
| Total surface water consumption for irrigation | hm$^3$ | 1.54 | *0.24* | 2.18 | *0.33* | 4.69 | *0.72* |
| Total groundwater consumption for irrigation | hm$^3$ | 9.99 | *3.65* | 14.10 | *5.17* | 30.30 | *11.10* |
| Total domestic water consumption for irrigation | hm$^3$ | 0.69 | *0* | 0.98 | *0* | 2.10 | *0* |
| Total recycled wastewater consumption for irrigation | hm$^3$ | 0.48 | *0.99* | 0.67 | *1.40* | 1.45 | *3.00* |
| Total electricity consumption | MWh | 6.66 | *1.61* | 9.41 | *2.28* | 20.20 | *4.89* |
| Total consumption of phytopharmaceutical products | t | 9.00 | *3.62* | 12.70 | *5.11* | 27.30 | *11* |
| Total consumption of fertilizers | t | 711 | *185* | 1000 | *261* | 2160 | *560* |
| Total waste production | t | 2,640 | *1,310* | 3,730 | *1,860* | 8,010 | *3,990* |
| Total green waste production | t | 2,100 | *633* | 2,970 | *894* | 6,370 | *1,920* |

Source: University of Algarve, 2003

The analysis of the results, presented in Table 4, may be performed through the direct comparison of the two alternatives in each scenario and between different scenarios. These simulated results indicate the following in regard to the environmental pressure indicators :

- In each scenario, alternative 2 promotes environmental improvements with respect to savings in the consumption of water for irrigation (60 %), electricity (75 %), phytopharmaceutical products (74%), fertilizers (74 %) , the production of wastes (50 %) and greenwastes (70 %);

- Alternative 2 of the baseline scenario appears as the best option from all scenarios;

- For some indicators (*e.g.* "total water consumption for irrigation") alternative 2 of the moderate scenario may configure as a better option than alternative 1 in the baseline scenario.

These results support the conclusion that, from an environmental perspective, the ideal development situation for the golf in the Algarve would be:

- To maintain the number of golf courses close to the baseline scenario (29 golf courses equivalent of 18 holes);
- To complement the scenario analysis in terms of environmental management indicators with a case-by-case evaluation of the new golf course projects against the licensing criteria and classes present in Section 3.
- To promote the implementation of environmental management tools in all the golf courses, which would allow for closing the gap between the average and the benchmark indicators.

In relation to the implementation of environmental management tools, it should be referred that 17 % of the current golf courses have already obtained an environmental certification for an Environmental Management System implemented according to the ISO 14001 standard, 37 % have established environmental policies and 30% have implemented environmental programs (for example, 7 courses followed the *Committed to Green*). It should be stressed that the principle of continuous improvement of environmental performance underlies the implementation of these tools, which constitutes a valuable indication of the organizational commitment towards environmental management.

### *4.4 Comparison of the scenarios*

The concept of sustainability is seated within the compatibility of the three vectors of development: the environment variations 1 and 2, the company and the regional economy.

The analysis exercise, about the future prospects of the golf industry in the Algarve, is based on the "pyramid" of sustainability. The chain of potential impacts of golf on the company (business), socio-economical and environmental areas are determined from the developed indicators which permit the situation of each scenario to be studied within the pyramid.

Of qualitative form, it can analyse the distance of each scenario form the upper vertex of the pyramid (or center of the triangle from an overhead view), that represents the ideal situation in terms of sustainability.

The following table presents the determinations attributed, by dominion, to the analysis that permits the location of each scenario in the pyramid.

Table 5          Positioning of each scenario in relation to sustainability

| Area of analysis | Reference Scenario | Moderate Scenario | Massive Scenario |
|---|---|---|---|
| Environment | ⊗⊗⊗ | ⊗⊗ | ⊗ |
| Company | ⊗⊗⊗ | ⊗⊗ | ⊗ |
| Regional Economy | ⊗ | ⊗⊗⊗ | ⊗⊗ |

Scale: ⊗ far; ⊗⊗ near; ⊗⊗⊗ very near

Source: Universidade do Algarve, 2003

The qualitative consideration of sustainability identified in the above table represented in the pyramid of sustainability.

**Figure 5          Pyramid of Sustainability**
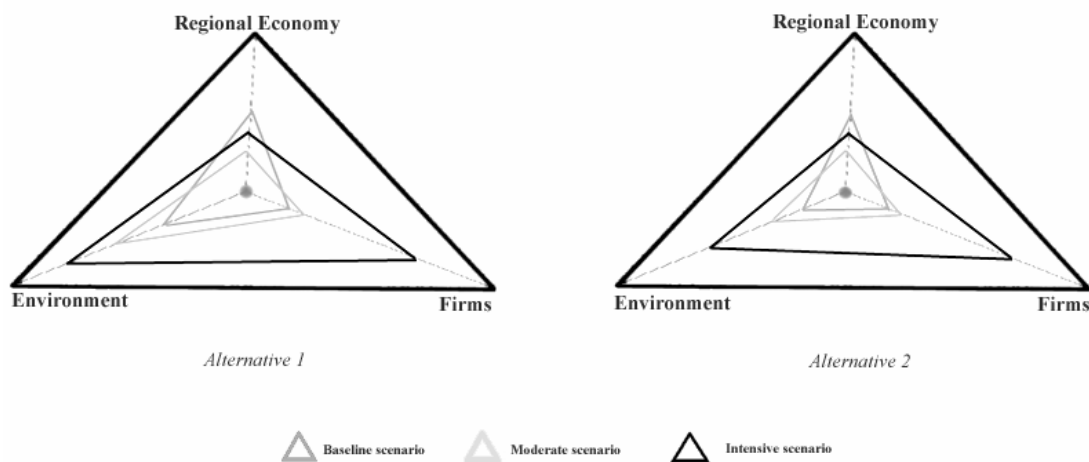


The scenario that is considered the most sustainable is situated closest to the center of the triangle, which is the equivalent to the maximum qualitative level of complementarity between company competitiveness, the protection of the environment and regional development.

In figure 5, the positioning of the scenarios is analysed: baseline, moderate and intensive scenarios. It can be observed that the corresponding areas of the designed triangles for the baseline and the moderate scenarios are much less than the area of that of the massive expansion. In this figurative analysis, this means that the scenario of massive

expansion is the most distant from the central point of sustainability. In the direct confrontation between the reference scenario and the moderate, it can be noted that there is a *trade-off* between the vertices of impact. The reference scenario has a lesser negative environmental impact, and while it is the scenario that generates the greatest gains in business competitiveness, it also is more associated with the overcrowding of the courses. The comparative analysis with the moderate scenario reveals that the amplitude of the variation between the business gains is not significant, if compared to the situation of excellence obtained in the level of occupation of the courses. The massive expansion scenario obtains the worst performance (furthest from centre) in terms of environmental and business impacts. The gains at a regional economic level derived from this scenario grow at a decreasing rate when they are placed in an indifferent situation with the moderate scenario.

Figure 6          Positioning of the Scenarios in the Pyramid of Sustainability - Variation 1 & 2
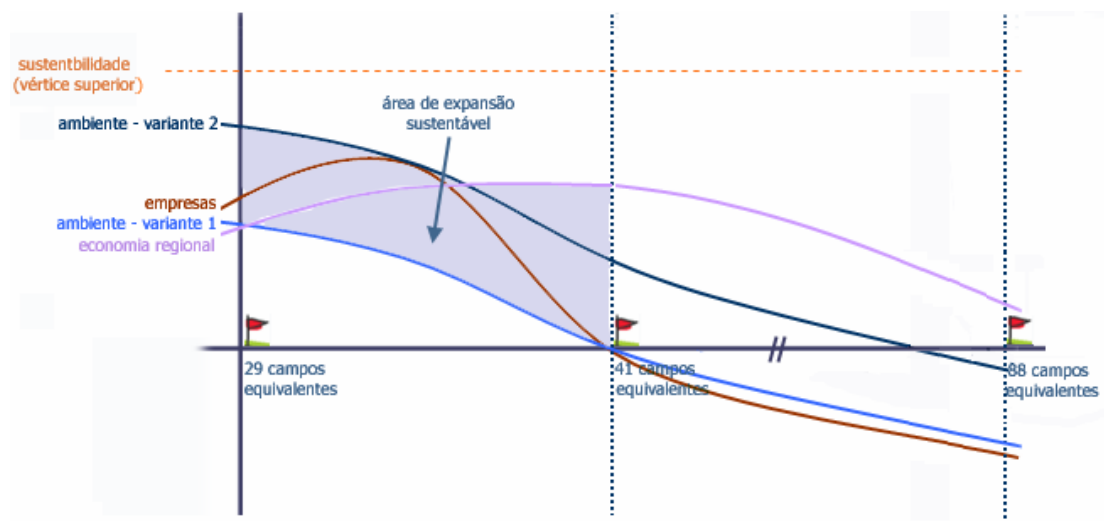


Source: University of Algarve, 2003

To consider the representation of the highest quality for the environment variation, it can be observed that the areas of impact of each triangle/scenario are substantially reduced. The ideal environmental situation, among all options analysed, is that of variation 2.

On the other hand variation 2 of the moderate scenario represents the best in terms of global environmental performance of golf courses in the Algarve, not only relative to variation 1 of the moderate scenario, but also when compared to variation 1 of the reference scenario. For such it would be necessary to implement a set of measures that approximate the average environmental performance of the courses to the values obtained for variation 2,

without forgetting the beforehand need to cautiously locate the new curses and evaluate their predicted environmental impact in this scenario.

Figure 7 combines the different possible boundaries of sustainable expansion of golf, from the business, regional economic and environmental viewpoints.

Figure 7                 Area of Sustainable Expansion of Golf from the Business, Regional Economic and Environmental Viewpoints



Source: Universidade do Algarve, 2003

## 5. Conclusions

The primary options of planning and developing sustainable golf in the Algarve must originate from the reference and moderate scenarios (respectively 29 and 41 eighteen-hole golf courses in 2020).

The moderate scenario presents the greatest aggregate economic benefit (total expenses), a fact that must not be neglected due to the multiple effects that golf generates in the remaining sectors integrated in the processional chain of tourist production. On the company level, it is also the moderate scenario that shapes up to be the most sustainable. Although the reference scenario will allow for the largest profits in the short term, these dividends result from a situation of excess demand, a situation that cannot be maintained in the long term. By itself, the amplitude of variation of the gains resulting from the reference situation, when compared with the gains from a situation of excellence in the level of demand (moderate scenario), do not justify the risk.

Cumulatively, it is the moderate scenario that permits, in physical terms, a greater proximity between supply and demand concerning the levels of occupation. A set of optimum prices is suggested for both sides of this equation.

This way excessive pressures on the demand side will not occur (demand does not overpass optimum levels of occupation); while also assuring that there will not be excessive pressure from a situation of oversupply (danger of a degradation of prices and quality).

Here results the highest economic performance for a convergence on equilibrium at the optimum levels of quality. The moderate scenario is the one that must be taken as the first economic option in the future development of the golf product in the Algarve.

Lastly, in relation to the criticisms evidenced in the massive expansion scenario, there will moves to deviate from the number 41, for the limiting number of golf courses in 2020. It is preferable, for economic results, in the regional ambit, that deviations from the plan are marked out from the reference scenario. That is, that the planning and development of golf in the Algarve must assume that the number, 41 courses, must be the limit from above, and not from below.

In the frame of expansion of golf courses until this limit, as was previously mentioned, it would be necessary to adopt a set of measures that permit the approximation of an average environmental performance of the courses, to the values obtained in variation 2. By doing so, the moderate scenario will not increase the environmental pressures generated by the operation of new golf courses that, for their part, produce impacts on the natural element of the region.

It can be verified that the impact of more than 41 golf course equivalents does not permit a sustainable expansion of golf in the Algarve. It is concluded that between 29 and 41 golf courses are sustainable in the Algarve from economic, business (company) and environmental standpoints.

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