Environmental and Economic Gap-Win analysis of the ski area development in the Romanian Carpathians. Case study: Cocoș Ski Slope, Bistrița County

Ioan BÎCAa1, Eduard SCHUSTERb, Horea ȘTEFĂNESCUa

Babeș-Bolyai University, Cluj-Napoca, Bistița Năsăud Extension, No 3-5, Str. Andrei Mureșanu
Code 420117 Bistrița, Romania

Abstract: Ski slopes are tourism infrastructure with both leisure and socio-economic functions. Ski slope planning should take into account several factors: relief, land use, biodiversity, access, water resources, weather conditions, the ownership legal status of the land, facilities and community services, and number of potential skiers. Thus, the study aims to analyse the environmental and economic gains and weaknesses of one recent launched Romanian Carpathians ski slope, named Cocoș. The results reveal that in recent years, in Romania a lot of settlements developed ski slopes in order to expand the leisure opportunities for their population and to increase the number of tourists. In some cases, the development of ski areas doesn't take into account the required natural preconditions, such as altitude and climate, thus effecting their dysfunctional operation. This is the case of the ski slope outside Bistrița municipality, which has been constructed, with money from a bank loan, in a low altitude area with reduced snowfall. Thus, during the 2017-2018 winter season, the ski slope has been opened for just 10 days, getting an income of almost €20,000, while maintenance costs rise to nine times more than the revenue. Our findings demonstrate that ignoring the environmental conditions and with superficial feasibility study send this project as an example of bad practices in the field of leisure and tourism. In order to recover the investment costs and to utilize the cable transport facility, the municipality intends to use the chairlift during summer; building an alpine coaster and outfitting the lift with bicycle trailers also without a scientific and/or a marketing approach could compromise further the investments.

Key words: ski slope, community ski project, Carpathians, Romania, trails, environmental and economic weaknesses

Introduction

In Romania, the Carpathians cover 27.8% of the country's surface (Velcea, 1987), being the most suitable area for the development of ski area. this favourability, the planning of the ski areas is must make the inventory and evaluation of potential sites for the location of the ski slopes, which should take into account the following

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elements: landforms (slope, aspect, geology, micromorphology, length, width, level difference) land use, biodiversity (flora and fauna), access, water resources, weather conditions (snow, texture of snow, frequency, intensity and direction of winds), the legal ownership status of the land, facilities and community services, number of potential skiers (Wingle, 1994; Harding, 2006; Erdeli, Gheorghilaș, 2006; Mill, 2008). Consequently, the interdisciplinary approach is recommended bringing together ecologists, geographers, geologists, climatologists, hydrologists, foresters, pedologists, landscape architects, builders, economists, businessmen and skiers (Wingle, 1994).

Their building is just the first phase, but the exploitation emphases a continuous evaluation on the environmental and economic impacts. The studies revealed that the leisure activities in the ski areas, involve pressures on soil, vegetation, wildlife which requires a judicious management or in many cases environmental restoration (Burt & Rice, 2009; Freppaz et al., 2013; Krautzer et al., 2013; Rixen, 2013; Pintaldi et al., 2017). Therefore, it is necessary the elaboration of master-plans showing existing conditions and future arrangements in the ski areas. As the ski slopes have socio-economic importance, providing jobs, stimulating the development of business, they achieve significant revenues to companies and local communities. Therefore, both preliminary and continuous monitoring is needed regarding the economic gains or loss. (Stynes & Sun, 2001).

During communist period, Romania had several areas with ski facilities concentrated on Prahova Valley, Brașov area, Semenic Mountains, Cindrel Mountains, Vatra Dornei, and Tarcu Mountains etc. In 2001, 73 ski slopes were in function (Cianga & Racasan, 2015), thus in 2003, the Romania’s Govern lunched a project to revive and refurbish Romania’s ski areas, named „Super-ski in the Carpathians” (Law No. 526/2003). This project was legalized and stipulated that the Ministry of Tourism and the National Institute for Research and Development in Tourism should identify the best areas in Romania for skiing and other winter sports. Local administrations had to identify the locations on which runs could be constructed, to elaborate the urban planning documents, to build and develop the ski areas, the cable transport installations, the lighting systems, and the artificial snow machines. Due to many changes of law, at the end of this first call, in 2008, Romania had not much to report. Therefore, the Romania’s Govern renamed this project as „Ski in Romania”, and changed the rules of financing, both form local budgets and the Ministry of Regional Development and Tourism. The list with local administrations as potential eligible entities was published in Government Decision (GD) (GD No. 190/2009). During 2009-2013 the number of ski slopes and ski area increased, but many projects were
not finished. That’s why in 2017, a new GD has to be promulgated (GD No 558/2017), which listed 55 projects for financing during the period 2014-2020.

Among the ski areas included in both acts it can be can mention: the resorts from the Prahova Valley (Sinaia, Bușteni, Azuga), Râșnov, Poiana Brașov, the resorts from the Jiu Valley (Vulcan, Parâng, Straja), the ski domains Șuoreanu and Transalpina, the towns of Câmpulung-Moldovenesc and Gura Humorului (Suceava County), Piatra Neamț (Neamț County), the resorts from Bors, Bucin, and Tușnad (Harghita County), etc.

The proposed projects aim to develop ski area in many places, some in well-known resorts, and others in the new settlements.

Competition and the desire to develop tourism have pushed many communities to turn to these facilities without being included in the eligible lists in official government documents. The most interesting is the Bistrița Municipality, which, in 2011, approved the development of a ski area outside the town for recreational activities and winter sports. In order to finance the project, the town council has a Bank loan reimbursed for twenty years. The main reason for the development of this ski run was the townspeople’s tradition for mass and competition-level winter sports (ski associations, championships) and the large number of skier who had to travel for 100 – 130 km to the nearest ski slopes (Toplița, Cavnic, Șuior, Borșa, Vatra Dornei, Mestecăniș).

In order to avoid many unsuccessful projects for skiing during the period 2003 and 2018, the present study aims to analyse the environmental and economic gains and weaknesses of Cocoș ski slope, recent launched in Romanian Carpathians.

The objectives of research starting with analyse of the implementation stages of this project; the assessment of inadequate geographic conditions on its functionality and economic gains and losses researched in media through the perceptions of stakeholders, local community and tourists.

2. Material and Methods
The official data related to tourism legislation was used to achieve the theme starting with Tourism Ministry Order No 491/2001, Law No. 526/2003, regarding „Super-ski in the Carpathians” National Plan on Alpine Tourism Development and ending with Local Council of Bistrița’s Decision No. 128/28.07.2011, abut the approval of the Feasibility Study for the investment objective „Ski Run Development Including Facilities Within the Multipurpose Sports Complex in the Outskirts of Bistrița – the Component Locality Unirea, Second Variant“.
The most important are the observations on the ski slope construction works in the timeframe 2015 – 2017, and on natural conditions and operation services. The first direction of observation included delimitation of the ski slope, clearing, grading the ski slope, drainage realization, the construction of the reservoir, chair lift, night lighting system, and snow cannons installation, etc. based on technical characteristics.

The second direction was focused on: topography, local climate, environment, plus the operation services of it (chair lift and snow cannons service, production, distribution and levelling of artificial snow, etc.).

Additionally, there were collected data about the impact such a project has on a local level (tourists, local people, stakeholders, media, public transport, etc.).

Than, the analyse used the scooring and gap-win methods.

3. The research territory

The Cocoș ski slope is located on the north-western flank of the Ghinda Hill (676 m), which overlooks the depression alignment of the Bistrița Ardeleană River (namely the Bistrița-Livezile sector) from south-east, at 6 km from Bistrița, in the proximity of Unirea and Livezile (Figure 1). The Cocoș ski run is part of the planned Wonderland Multipurpose Sports Complex, started in 2013 by the Bistrița Municipality. This leisure complex will stretch over 274 ha and will comprise various sports facilities: ski, ice skating, swimming, polo, badminton, cycling, horseback riding, golf, and will be constituted of accommodation and office buildings, floodlit ski and snowboard runs, swimming pools, water park, mountain bike lanes, tennis and basketball courts, football field. The costs of this project are estimated to 27 million Lei (6 million €).

According to the technical documentation of the project (Decision No. 128/28.07) the ski slope has following characteristics:

a) category: intermediate/easy
b) technical parameters: length = 1335 m; maximum width = 35 m; drop = 257,5 m; start point = 676 m; finish point = 418,5 m
c) chairlift: length = 1182,71 m; 4 seats; speed 2,6 m/s; capacity: 1200 persons/hour; 10 towers; 57 carriers
d) snow making machines: 4 units with a flow rate of 6,7 l/s
e) alternative route = 447,10 m
f) parking: 3 levels, 493 places
g) other equipment: ticketing, dining area, sports equipment rental.
4. Results and discussions

4.1. The ski slope project

In 2010, the Local Council of Bistrița approved, the building of the multipurpose sports complex Wonderland, near Unirea, in the water meadow of the Bistrița River and on the northern slope of the Ghinda Hill (676 m) (Decision No. 241/22.12.2010), (Figure 2). It is followed by approval of a Feasibility Study for the investment objective „Ski Slope Development Including Facilities Within the Multipurpose Sports Complex in the Outskirts of Bistrița – the Component Locality Unirea, Second Variant”, in 2011, anda loan (€ 4.4 million) for a period of 10 years to build the ski run and an access road with a bridge over the Bistrița River. In 2015, a Romanian company won the auction and started the construction works on the ski slope.

Consequently, several operations begun: deforestations, leveling, facilities, aerial lifts installation, construction of a water reservoir and various buildings, snow gun installation, building a transformer station, roads and concrete platforms.

In November 2017, the ski slope received its homologation after an alternative route around the steepest part of the run was finished. The homologation was given by the Authorization and Monitoring Direction within the Ministry of Tourism, through the Homologation Note of the „Cocoș” Ski Run in Bistrița, Component Locality Bistrița (Act No.234/28.11.2017, Bistrița City Hall).
Due to adverse meteorological conditions, in the first month of 2018 the ski slope opened only for 10 days (3 days in January, 2 days in February and 5 days in March).

Figure 2. The topographic localization of Bistrița ski slope. Source: Topographic map, scale 1:25 000, 1984-with changes

4.2. Analysis of natural conditions

The ski slope is located on the northwestern slope of the Ghinda Hill (676 m), at the contact between an alluvial hillside, a glacis, and the second terrace of the Bistrița Ardeleană River, which gives it a particular longitudinal profile, combining straight sectors with slightly concave and convex ones that were greatly adjusted during the construction works (Figure 3). The slope orientation of the ski run is correct, towards NNW, thus reducing sunlight and keeping the snow for a longer period of time. The average inclination of the ski run is 19.2%, giving it an intermediate difficulty level (intermediate-difficult in its upper section, and easy in its middle and lower sections). Separately, the lower section has an inclination between 10° and 15°, while the upper section has an inclination between 25° and 35°. This gradient distribution creates some problems for beginners, and therefore a second, circumventing variant was built to the East, around the upper sector. Nevertheless, this was incorrectly designed, as it enters the main ski run at the steeper part instead of entering at the base of the upper sector.
The micro-morphology of the initial alluvial hillside consisted of several platforms that were partially leveled, so that presently the surface of the ski run does not show major uneven sections, consisting of relatively flat or slightly undulated surfaces, thus influencing the descent, which might prove tougher in the upper sector and more relaxing in the lower one.

**Figure 3.** The geomorphological profile of the Bistriţa ski slope. Source: Topographic map, scale 1:25 000, 1984

The terrain of the three geomorphological units (hillside, glacis, terrace) provides sufficient space for the ski run (the main run and the circumventing variant), the lateral extension, and the equipment (chairlift pylons, water basin, floodlights pylons, protective fences). Given its position, the ski slope offers viewpoints toward the Bistriţa Ardeleană Valley, the Strâmba hillcrest, the Heniu Mare massif in the Bârgău Mts., and the Ineu massif in the Rodnei Mts.

The ski slope is located within a microclimate of intermediate hills and depression alignment, characterized by insufficient natural snow, low snow depth (max. 20-30 cm), short and irregular snow cover duration (Figure 4), insufficiently low temperatures for the generation of artificial snow, short period of optimal temperatures for the generation of artificial snow (Figure 5), and strong atmospheric movement. Due to its configuration, there have been identified two topoclimates on the ski run: the topoclimate of the lower ski slope showing temperature inversions
and smaller amount of snow, and the topoclimatic of the upper ski run, with weak temperature inversions and higher snowfall.

**Figure 4.** The number of days with snow cover in Bistrița. Source: personal observations.
After the completion of the construction works, the ski run shows the following geomorphological features:

a) position: the north-western slope of the Ghinda Hill (676 m);

b) starting point: 676 m;

c) finish point: 418,5 m;

d) descent: 257,5m;

e) configuration: curved, with three sections:
   - the upper section: slightly sinusoidal, with a straight segment between 676 m and 600 m (SSE-NNW) and a curved segment between 600 m and 550 m (S-N-SE-NW);
   - the intermediate section: straight, to the right, between 550 m and 475 m (SW-NE);
   - the lower section: straight, to the left, between 475 m and 418 m (SSE-NNW);

f) the geomorphological profile of the ski slope is generally concave, with an average incline of 19.7%, with three sectors showing different geometric and micro-geomorphological features, as follows:
   - an upper straight section with a 30° incline, between 676 m and 600 m;
   - an intermediate section with sizeable uneven terrain, between 600 m and 500 m, and inclinations between 25° and 30°;
   - a lower section without noticeable undulations, between 500 m and 418 m, and inclinations between 15°and 25° (Figure 7);

g) The microrelief of the base surface:
   - relatively plain surfaces;
   - slightly uneven surfaces (undulations, steps, minor slope breaks);

h) Substratum features:
   - gravel, resulted from the erosion of the conglomerates that forms the underground;
   - clay soil.

4.3. Assessment of the economic impact

The ski slope is located at 6 km from Bistrița, 2,5 km from Unirea and the Bârgău Valley, and 7 km from Livezile. The access is done from the DN17 national road, from
Bistrița through Unirea or from Livezile through Unirea, then by a local, modernized road from Unirea to the base of the ski run.

The ski slope will attract winter outdoor enthusiasts from Bistrița and from the villages of the Bârgău Valley with tradition in winter sports, as well as from a larger area, such as the Someș Valley or other parts of the Bistrița-Năsăud County.

Figure 6. The revenues from ski slope exploitation in 2018 winter season. Source: The Bistrița City Hall.

According to The Bistrița City Hall data (Decision No. 143/31.08.2016) for the year 2018, the following maintenance and operation costs of the ski slope are estimated:
- Technical assistance for the snow making machines = 30 000 Lei (6521 €);
- Authorized chairlift maintenance (2 services) = 42 000 Lei (9130 €);
- Retract technical maintenance = 7 000 Lei (1521 €);
- Ticket desk technical assistance = 5 000 Lei (1100 €);
- Ski run security for 12 month = 132 000 Lei (28 695 €);
- Fuel, lubricants, silikagel, petrolatum, oils = 80 000 Lei (17 391 €);
- Utilities = 85 000 Lei (18 478 €).

The investment costs for the year 2018 are distributed as follows:
- Training course for chairlift operation = 30 000 Lei (6521 €);
- Acquiring inventory items: protection net, protection mattresses, signaling lights, beacons, signposts, chainsaw, string trimmer harness, string trimmer nylon line, cast iron hoes with wooden shaft, metal shovels with wooden shaft, power drill, cordless power drill, tool set, etc. = 80 000 Lei (17 391 €);
- Mountain bicycle racks on the ski lift – 37 pcs. = 52 000 lei (11 304 €);
- Chairlift operator for 4 months = 180 000 Lei (39 130 €);
- Grass seed (3000 kg for grassing the ski run) = 40 000 Lei (8 695 €);
- Total investment costs = 382 000 Lei (83 043 €).

This indicates the expenditures and investments for the year 2018 amount to 763 000 lei (165 869 €), even as the revenues from its 2017-2018 season operational period sum up to only 88 697 Lei (19 282 €), resulting in a deficit of 674 303 Lei (146 587 €) that will be paid off by the citizens of Bistrița.

4.4. Global assessem
For the assessment of the ski slope, there has been created a scoring evaluation sheet containing 10 criteria, graded from 0 to 10. The final score is obtained by totaling the points given for each criterion and dividing it to 10 (table 1).

Table 1. Scoring sheet for the Cocoș ski slope

<table>
<thead>
<tr>
<th>No.</th>
<th>Criterion</th>
<th>Description of the criteria</th>
<th>Points 0-10 p</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Relief altitude</td>
<td>Intermediate hills (676 m) and depression alignment, with influence on the microclimate.</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>Technical parameters</td>
<td>Length, width (to small in the upper sector), NNW exposure, curved trajectory, relevant for the descent speed, straight cross section, steep longitudinal section in the upper sector (dangerous for beginners) with a milder angle at the bottom of the ski run (beneficial for stopping), without notable uneven terrain, sufficient drop and general inclination, inadequate alternative route.</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>The micro relief of the base surface</td>
<td>Alluvial, undulated hillside, glacis, terrace, relatively plain surfaces or showing minor undulations, small slope breaks, relevant for the descent speed, insufficient surface levelling (earth clumps, gullies), transverse draining ditches.</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>Natural environment, impact, avantage point</td>
<td>Blunt hill relief at the contact with the Bistrița Ardeleană depression, vantage point over the landscape, good illumination, forest strip at the upper end, low impact on the environment, no air pollution sources.</td>
<td>7</td>
</tr>
<tr>
<td>5</td>
<td>Microclimate</td>
<td>Low snowfall, thin, short-lived snow cover, short time period with low enough temperatures for artificial snow creation and</td>
<td>4</td>
</tr>
</tbody>
</table>
preservation, occurrence and frequency of temperature inversions, exposure to winds.

<table>
<thead>
<tr>
<th></th>
<th>Mechanization</th>
<th>Simple, fixed grip chairlift (high security, sufficient capacity, relatively high comfort, moving walkway boarding, low speed, easy disembarking) and no intermediate terminal; low power water pumping system.</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Proximity</td>
<td>The vicinity of the town and the Bârgău Valley.</td>
</tr>
<tr>
<td>8</td>
<td>Access</td>
<td>Unpaved road, public transport.</td>
</tr>
<tr>
<td>9</td>
<td>Features</td>
<td>Low capacity water basin, insufficient snow making machines, drainage system, floodlighting, tower protection, electronic card access devices (ski pass gates, ski check controls), video monitoring system, audio system, three stores parking - insufficient, ticket desk, restaurant, restrooms, equipment rental.</td>
</tr>
<tr>
<td>10</td>
<td>Economic and cultural-educational relevance</td>
<td>Tourism attraction, local budget revenues, integration with the Wonderland leisure complex, winter sports tradition, encouragement for performing winter sports, creating the mentality for spending free time in an active manner, promoting Bistrița as a tourist destination.</td>
</tr>
</tbody>
</table>

| Total | 10 criteria | 5.2 |

The final score is 5.2, placing the ski slope among the non-profitable ones, with a short operation period, depending on meteorological conditions, thus not justifying the investment of 4,4 million euros. This fact is demonstrated also by the balance between the revenues from the 2017-2018 season and the maintenance and operation costs (Figure 6).

The Gap-Win Analysis of the ski slope reveals nine win points and 14 gaps (Table 2).

While win points will favour winter mass sports, adding leisure facilities at Wonderland for local potential consumers, this could also be a suitable place student internship, reviving the performance-level alpine ski in Bistrița by re-instating the alpine ski specialization within the Sport Program High School in Bistrița. It is possible to strengthen the tourist attraction of Bistrița within it and by a good promotion.

To avoid all gaps the study highlights the need for building new facilities for biking, an alpine coaster, an alternative route for beginners, air sports, qualifying the stuff.
These are expected to rise the financial gains for local community. In the same time, the extension of urban facilities should be urge (water, sewage system, green energy power station) to the Ghinda Hill in order to accommodate some food serving units (coffee, refreshments, snacks, etc.).

Tabel 2. The gap-win analysis of Cocoș ski slope

<table>
<thead>
<tr>
<th>A) Gap points</th>
<th>B) Win points</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A1. Environmental</strong></td>
<td><strong>B1 Environmental</strong></td>
</tr>
<tr>
<td>Low altitude;</td>
<td>The proximity to Bistrița and the villages from the Bârgău Valley, with tradition in winter sports;</td>
</tr>
<tr>
<td>- Blunt natural environment;</td>
<td>- Good air quality.</td>
</tr>
<tr>
<td>- Unfavorable microclimate (reduced snowfall, short period with low temperatures)</td>
<td></td>
</tr>
<tr>
<td><strong>A2. Economic</strong></td>
<td><strong>B2. Economic</strong></td>
</tr>
<tr>
<td>- Contradictory media promotion campaign;</td>
<td>- Motorized access;</td>
</tr>
<tr>
<td>- Insufficient technical equipment, given the size of the ski run (more snow making machines and lances for artificial snow generation were required, and the water pumping and transport system needed to be larger);</td>
<td>- Public transport access;</td>
</tr>
<tr>
<td>- The longitudinal section and the width of the alternative route (around the upper sector) are very inadequate;</td>
<td>- Facilities (chairlift, snow making machines, floodlight, other utilities);</td>
</tr>
<tr>
<td>- The artificial snow making infrastructure should extend to also cover this route with fixed artificial snow lances;</td>
<td>- Parking;</td>
</tr>
<tr>
<td>- No intermediate chairlift terminal;</td>
<td>- Acceptable technical parameters (length, width, mean inclination, drop, trajectory, cross section and longitudinal section);</td>
</tr>
<tr>
<td>- No surface lift for beginners;</td>
<td>- A geometry that allows for initiation in basic ski techniques (in the lower sector, with a milder slope gradient), as well as for consolidating and perfecting ski techniques, or for organizing ski competitions (in the upper and median sectors);</td>
</tr>
<tr>
<td>- No advantageous alternative route for beginners;</td>
<td>- A large number of ski lovers and skiers in Bistrița-Năsăud County, an area with tradition and notable results in alpine and Nordic skiing;</td>
</tr>
<tr>
<td>- Insufficient snow making machines;</td>
<td></td>
</tr>
<tr>
<td>- Low volume water basin;</td>
<td></td>
</tr>
<tr>
<td>- Poorly qualified staff.</td>
<td></td>
</tr>
</tbody>
</table>

4. Conclusion

The ski slope from Bistrița is part of the local communities' program in Romania to offer winter leisure activities to the population and to increase the number of tourists. It was accomplished with the help of a 4.4 million € bank loan contracted by
the Municipality, without taking into account that the natural conditions for such a facility (relief altitude and microclimate) are improper. According to the Municipality of Bistrița, the investment will be paid off in 10-15 years through the economic development of the area (pensions, restaurants, homes). Hence, the ski slope operated for only 10 days during the 2017-2018 season, gaining revenues nine times lower the maintaining costs, the future revenues for next 30 years are over estimated. The scoring analysis highlights that Cocoș Ski Slope with 5.2 point from ten points as maximum possible, has more gaps than win achievements. In this regards several measures are identified to be done, including the one offered by Bistrița Municipality namely the construction of an alpine coaster and equipping the ski lift with bicycle racks.

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References


