Evaluation of the geotourism development potential in Malá Fatra mountain range

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Abstract
The presented article describes the geotouristic potential of Malá Fatra in the context of promoting the development of geotourism in the territory. The main focus is on the existence of geo-objects whose formation is determined by the actual geological structure of Malá Fatra as the potential development of geotourism. The amount of local geological phenomena, cultural and historical heritage in relation to the geographical nature of the area of these mountains form a valuable and unique geotouristic potential that promotes the competitiveness of geotouristic destination.

Key words: geotourism development potential, Malá Fatra mountain range, objects of geotourism

INTRODUCTION

Geotourism, as an integral part of tourism is essentially based on discovering geological objects, including technical, cultural and historical monuments with an emphasis on their aesthetic and historical value. In the area of Slovakia there are more territories where geotouristic objects are located and that have relatively strong potential for development of geotourism. Such territories include the Malá Fatra mountain range, which geotouristic potential is based on several major geotouristical sites suitably supplemented by cultural- historical tourism objects. Spatial objects located in Malá Fatra, which determine the competitiveness of its geotourism synergistically create a tourist experience of visitors and at the same time emphasizes the geographic nature of this geotouristic destination. It is for these reasons the geotouristic objects should constitute the essence of geopropagation of Malá Fatra mountain range in geotourism.

GEOTOURISM AS A PART OF TOURISM

Geotourism is the tourism sector whose main task is to highlight natural geological interest with regard to its cultural heritage, historical and technical aspects, social ties and habits of the local population. Thomas A. Hose (1997) defined geotourism as a new form of tourism with considerable growth potential. In his presentation, the focus should be placed on providing services that enable tourists to access information and knowledge of the geology and geomorphology of the area. The main objective of geotourism is to present individual geological phenomena such as caves, volcanoes, waterfalls, rock formations and the like (Rybár, et al., 2010). The very concept of geotourism is unknown to the public and it is a part of

recreation of almost all actors involved in tourism in Slovakia and abroad.

ALGORITHM OF EVALUATION OF GEOTOURISM POTENTIAL IN SLOVAKIA

To rate geotouristic potential in Malá Fatra an algorithm consisting of individual steps necessary to get the real picture of geotouristic opportunities in the mountains was created (Fig. 1). The first step of the evaluation is to determine the tourist area, brief description of the geological and geomorphological point of view. Subsequently, the mountain territory is analysed in terms of tourism potential, which consists of its evaluation based on the document issued by the Ministry of Economy, Department of Tourism - Tourism Regionalization in the Slovak Republic. The next step for the evaluation of potential geotourism in SR is identification of geotouristic objects in the studied area and their categorisation. After analysis, classification and evaluation selection of spatial objects for the needs of their actual utilization in geotourism is essential. The final step is the selection of appropriate geotouristic objects and their subsequent promotion.

DEFINITION OF TOURIST AREA

There is a relatively small number of samples of publications about Malá Fatra in the book market which deal with the mountain range wider than a tourist guide. From the publications issued before 1990 we can mention the work of team of authors *Malá Fatra, protected area* which in detail deals with Krivánska Malá Fatra which was a conservation area at the time of publication. Books *Nature of district Žilina and its protection* and *Lowlands, valleys and mountains of Slovakia, Malá Fatra - geological structure of the mountain* are a source of geological information on the Malá Fatra useful in geotourism. The *State list of specially protected areas* available online on the website http://uzemia.enviroportal.sk/ is also important.

Mala Fatra mountain range is a crystalline-Mesozoic mountain in the north of Slovakia, which consists of a crystalline core package and Mesozoic sedimentary rocks. On its completion the in vast majority crystalline rocks are involved. It consists of crystalline slate and granitoid rocks. Their representation is uneven. Mesozoic rocks, such as dolomite, quartzite, limestone and shale build the northern and south-western part of the mountains and a narrow strip of notches in its western edge, where some of the younger Paleozoic rocks rise. As the only mountain range in Slovakia Malá Fatra is divided into two parts by the river Váh (Team of authors, 2007).

A great diversity of geomorphological forms is attached on the geology of Malá Fatra. On the crystalline rocks, which predominate in Lučanská Mala Fatra and on the southern slopes of Krivánska Malá Fatra smoothly modeled surface shapes have been developed. Slopes of the ridges are mostly aligned, smooth with straight profiles. At the contact of quartzite and crystalline packing a series number of springs, for example Mojžišove pramene (Springs of Moses), which supply Šútovský waterfall were created. Relief on the schist is smoother in Lučanská Mala Fatra, hillsides and ridges are longer and less rugged. Different relief is on Mesozoic rocks. It is associated with their different resistance to weathering and also different structure. Mesozoic rocks of Choč Nappe, which is pushed over krížňanský sheet, form a complex of limestone and dolomite from the Middle Triassic to the Lower Cretaceous. An example is the rocky limestone-dolomite cap of Kľak in the southwestern part of the mountain range, or rocky debris of Choč Nappe of Big and Small Rozsutec. Erosion-resistant rocks of Choč Nappe created the most beautiful rock formations of Mala Fatra, such as Gorge

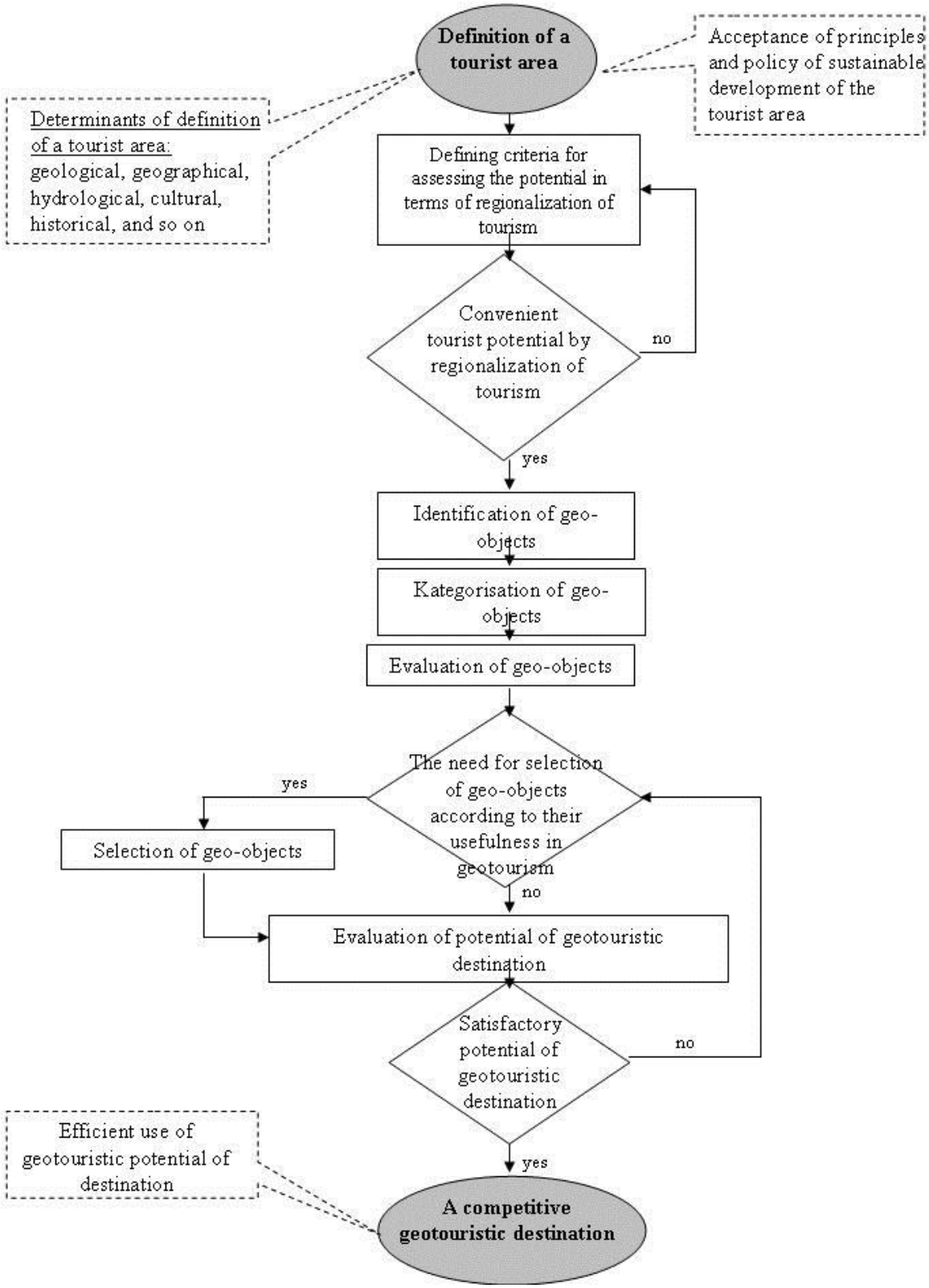

Fig. 1 Algorithm of geotourism potential evaluation in Slovakia

between Boboty and Sokolie (team of authors, 2007).

The territory of Malá Fatra can be divided into two parts due to karst formations: the territory built of limestone and dolomite packing and krížňanská series and the built up area of dolomites and limestones of Choč Nappe. The karst formations on the rocks and packing of krížňanská series cave formations, karst springs, gaps, and gorges occur. As an example we can mention the largest cave system in the end of Vrátna dolina, Jaskyňa pod vyvieračkou with a length of 550 m, which is closed to the public. At the area building by rocks of the Choč Nappe gorges, canyons, waterfalls, rapids, giant pots and caves occur, of which the best known and most precious is Kryštálová jaskyňa (Crystal Cave) (team of authors, 2007). This geological diversity of the mountains increases its geotouristic attractiveness.

EVALUATION OF THE POTENTIAL OF AREA FROM THE VIEW OF THE SLOVAK REPUBLIC REGIONALIZATION

Mala Fatra mountain range falls into 4 tourism regions defined by Tourism regionalisation in the Slovak Republic, namely: severopovažský, turčiansky, Orava and Liptov regions. Liptov region is represented by Stankovany village, which lies on the border of Velká Fatra mountain range. Given the small spatial area Liptov region was deliberately excluded from the analysis. The results of the analysis are presented in Tab. 1 (Team of authors, 2005).

From the perspective of Tourism Regionalisation in Slovakia Malá Fatra mountain range is located in the territory of the regions which med-term potential has national and international significance and long-term potential is assessed in all areas of international importance (team of authors, 2005). The highest potential for tourism activities in the regions are: stay/vacation near the water, stay/vacation at thermal water, hiking, Alpine skiing, cross-country skiing, getting to know cultural and historical monuments, visit museums and galleries, getting to know local traditions. Similarly, the potential of facilities is at a high level.

IDENTIFICATION, ASSESSMENT AND CATEGORIZATION OF GOEOBJECTS IN MALÁ FATRA

For evaluation and categorization of geo-objects in the monitored area it is important to identify them. This involves systematic familiarisation with the area available only from books, and electronic resources, but also by field survey monitored area.

Prof. Pavol Rybár (2011), the founder of geotourism in Slovakia, dedicated his article *Assessment of attractiveness (value) of geotouristic objects* to evaluation of geotourist objects. In the article the geotourist objects are viewed from two perspectives - both natural and anthropogenic objects. Natural objects are evaluated based on criteria such as: basic geological characteristics, uniqueness of property, its availability, existing scientific and professional publications, research conditions, safety criteria, the availability of information about the object, visual value of the geotouristic object, the value of services provided, or proximity of the visited tourist destinations. The anthropogenic perspective is necessary to evaluate the age of the building, its historical and aesthetic value, authenticity, excellence, experiential and practical value, the value of service, and safety criteria. Prof. Rybár highlights the need for valuation score of objects with sufficient differentiation of view on the subject in the selected criteria (Rybár, 2010).

The geotouristic potential of Malá Fatra can be divided into the following categories:

Tab. 1 Potential of regions by activities in Malá Fatra

Long-term potential	**VP**	Weight	Weight VP	Final VP	**VP**	Weight	Weight VP	Final VP	**VP**	Weight	Weight VP	Final VP
	Severopovažský region				**Turčiansky region**				**Orava region**			
Stay/vacation near the water	**3**	10	30	29	1	10	10	7	3	10	30	23
Water sports	**3**	3	9	9	1	3	3	0	4	3	12	6
Water touristics/sailing	**2**	3	6	11	1	3	3	6	1	3	3	1
Stay/vacation at thermal/mineral water	**3**	7	21	26	3	7	21	25	2	7	14	12
Stay in forest/mountain area	**4**	5	20	22	4	5	20	18	4	5	20	15
Walking/Hiking	**4**	10	40	40	4	10	40	37	4	10	40	32
Bicycle tours	**3**	6	18	18	3	6	18	14	3	6	18	11
Paragliding/hang gliding	**1**	1	1	4		1				1		
Alpine skiing	**4**	9	36	36	4	9	36	34	4	9	36	29
Ski tourism	**3**	4	12	13	3	4	12	10	3	4	12	7
Mountain climbing	**1**	1	1	4	2	1	2	3	2	1	2	-3
Visiting caves/speleology		1			1	1	1	5		1		
Stay in the countryside	**4**	3	12	15	3	3	9	9	4	3	12	7
Hunting	**1**	1	1	6	1	1	1	3	1	1	1	-1
Fishing	**1**	1	1	2	1	1	1	-1	1	1	1	-5
Getting to know cultural and historical monuments	**3**	10	30	37	3	10	30	34	3	10	30	28
Overall assessment of potential			**238**	**272**			**207**	**204**			**231**	**162**
Mid-term potential												
Stay/vacation near the water	**1**	10	10	6	1	10	10	5	3	10	30	22
Stay/vacation at thermal/mineral water	**3**	7	21	22	3	7	21	22	2	7	14	14
Water sports	**3**	3	9	6		3			3	3	9	3
Walking/Hiking	**4**	10	40	37	4	10	40	35	4	10	40	33
Alpine skiing/snowboarding	**4**	9	36	34	3	9	27	25	3	9	27	20
Cross-country skiing	**3**	3	9	9	3	3	9	7	2	3	6	2
Bicycle tours	**2**	6	12	9	2	6	12	7	2	6	12	5
Stay/vacation at the spa	**3**	7	21	24	3	7	21	23		7		
Visiting caves/speleology		1			1	1	1	5		1		
Getting to know cultural and historical monuments	**3**	10	30	35	3	10	30	34	3	10	30	27
Visiting museums and galleries	**3**	6	18	22	3	6	18	23	2	6	12	10
Getting to know local traditions	**1**	4	4	7	1	4	4	7	2	4	8	6
Visiting an event	**3**	5	15	18	1	5	5	8	2	5	10	6
Participation in/attendance at fairs and exhibitions	**1**	4	4	6		4				4		
Participation in congresses and conferences	**2**	4	8	11		4			1	4	4	0
Business tourism	**3**	4	12	16	2	4	8	10	1	4	4	5
Other sport activities	**2**	5	10	7	1	5	5	1		5		
Overall assessment of potential			**259**	**269**			**211**	**212**			**206**	**153**
Potential of facilities												
Lodging services	**2**	10	20	21	3	10	30	31	2	10	20	16
Information services	**2**	4	8	9	1	4	4	5	2	4	8	6
Overall assessment of potential			**28**	**30**			**34**	**36**			**28**	**22**

Source: processed according Regionalisation of Tourism in Slovakia
Note: VP – value of potential

- geomorphological forms
  - caves and pits,
  - waterfalls,
  - rock towns, canyons, giant pots,
  - quarries.
- thermal and mineral water,
- natural objects of European significance,
- cultural and historical conditions of the development of geotourism - traditions, crafts, folklore.

Geomorphological forms

Caves and pits

The most famous caves in Malá Fatra are Hoblíkova Cave, Upper Kráľoviansky Cave, Cave in Kraľovianska Kick, Crystal Cave, Old Stratenská Cave, Middle Kraľovianska Cave, Višňovská Cave, Žaškovská Cave and Cave under Fountains. *Upper Kraľovianska Cave* is located on the territory of the Kraľoviansky meander natural heritage. The cave is 120 meters long and is characterized by a remarkable stalactite decoration. In the cave there are invertebrates and bats. The bulk of the cave was destroyed by mining in the quarry. *Old Stratenská Cave* is located beneath Stratenec within the National Nature Reserve Suchý. It is 136 meters long and 31 meters deep. In the cave there were found the remains of bones of Quaternary animals. *Crystal Cave* in Little Rozsutec is best known cave to the public in the Malá Fatra. It is considered the Slovak unique cave decorations by drusen crystallized calcite. Its length is 26 m. Located within the National Nature Reserve Rozsutec. It is now extensively damaged by vandalism and, as well as all mountain caves in this area, inaccessible to the public (Podolák, 2008, Janáčik, 1981). In terms of geo-tourism it is a rare mineralogical site.

Waterfalls

Numerous waterfalls have arisen particularly in the areas of limestone rock. The largest and most visited is the protected *Šútovský waterfall*, located within the National Nature Reserve Šútovská Valley. It is 38 meters high and powered by Moses' sources rising below the top of Hromový hill. Equally geotouristically attractive is *Kľacký waterfall*, which was declared a protected national monument in 1992. It is located within the National Nature Reserve Kľak and is transformed through rapids and giant pots, which are an evidence of relief development of Lučanská Malá Fatra. In its vicinity there is recorded occurrence of endangered species of malacofauna as well as species indicating preserved primeval forest plantations (MŽP SR, 2013).

Rock towns, canyons, giant pots

Rock towns, canyons and giant pots are surface shapes that are more related to karst features, but mostly as a result of erosion processes, not karst processes (Janáčik, 1981). The most interesting morphological solitary object in Malá Fatra is a rock formation *Monk* located in the State Nature Reserve, which is rare for rare combination of rock towers and rock windows in one house. Another dominant rock formations in the appointed nature reserve are known under the following local names: Camel, Falcon Tower, Jánošíkova bed and other (Pagáč et al., 1983).

Rock cities are typical for Malá Fatra, the same genetic types are located in several places of the mountains. *Rock Town under Rozsutec* was created under the influence of gravity tectonics movements of contingent massif. It lies on the western slope of the Great Rozsutec and its name was created by the amount of towering formations. A prominent example of modelling by rock avalanches is the *Kreminná Valley*, which is still modelled by river erosion processes and karst processes (Galvánek, 1981). Kreminná Valley separates the Rock Town under Rozsutec from the Rock Town Poludňové Rocks. The height of reef shape is slightly lower and its territory are mushroom shapes, abri a cave hole (Janáčik, 1981).

Quarries

Quarry can be described as an open space for surface bearing designed for mining and

quarrying (Hronček, 2011).

In all mountains of Slovakia surface mining of granodiorite was significant. The largest quarries were in operation in Malá Fatra and in Bystrička, Dubná skala and Turany. In the past the area of Malá Fatra was particularly famous for quarries with extraction of limestone, dolomite and granite. Three older quarries near Rajec are known, in which light to dark brown bituminous Jurassic limestone was mined. In the fourth Baranová quarry weathered brown-white dolomite was mined. In 1840 dark brown limestone quarry was mined at Strečno in municipal quarry Široká skala. Similarly, greyish white dolomite was mined from 1870 from the general quarry Tureček. Limestone and granite quarry was located in Vrútky. Another famous quarry is Polom where Varin lime works gather limestone on the northern slopes of Mala Fatrá on the left side of Váh River. At Varín natural asphalt was mined in dolomite quarries (Hronček, 2011).

It is this quarry that is currently available for the development of geotourism in Malá Fatra. It is part of the trail Varín and surrounding of Malá Fatra National Park. Its area consists of two quarries. The upper quarry is overgrown with vegetation. The lower querry is unique in morphological mining properties. Quarry was flooded after harvest. Depth of the lake is 11 m.

The lake is now officially used for carp ground-catch by fishing association in Žilina under the name Lom Nezbud (Hronček, 2012).

Thermal and mineral waters of the mountain range

The Malá Fatra mountain range is rich in occurrence of thermal and mineral springs. There are currently recognized 5 natural healing resources and 3 natural resources of mineral table water. The best known natural source of mineral table water is the mineral water spring Fatra near the town Martin. Most abundant source of natural mineral waters in the Slovak Republic, located in the territory of the mountain, is the KM-1 borehole in the village Kláštor pod Znievom. The measured yield of the borehole is 11 l/s, used yield is 8 l/s (Hlavňová, 2011).

The most famous thermal springs are the springs in the spa town Rajecké Teplice. In the summer season in addition to the spa complex of Rajecké Teplice its services to customers also provides thermal water open air pool Laura. Thermal pool Veronika is located 7 km from the town Rajecké Teplice near the village Rajec. The third thermal bath is thermal spa Stráňavy located northeast of the village. It is currently under modernization (Hlavňová, 2011).

Natural objects of European significance

There are 15 national nature reserves, 9 wildlife reservations, 5 natural heritage areas, and 1 protected area in the national list of specially protected areas of the Slovak Republic recorded on the territory of Malá Fatra. An exception is the national natural monument Kľacký waterfall, which is administered by the National Park Veľká Fatra, although situated in the territory of Lučanská Malá Fatra (MŽP SR, 2013).

Fig. 2 Domašínsky meander
Photo by: Hlavňová

A geotouristically attractive natural sites of European significance is the natural monument (decalred in 1978) *Domašínsky meander* (Fig. 2), which was created by a gradual cutting of the river Váh in crystalline core of massive Malá Fatra at the end of Tertiary and start of Quaternary and created so amazing mountain scenery. In its vicinity there is the National Nature Reserve *Old Castle* (Fig. 3), which was declared in 1967 to protect forests with durmast oak and its crossbreeds, which are of relict origin as relic oakwoods of the early Holocene. Reservation is formed by forests east of the ruins of Old Castle, which is located on the right bank of the river Váh. The geological structure is formed by granodiorites (MŽP SR, 2013).

Fig. 3 View of a nature preserve Old Castle from ruins of Old Castle, **Photo by**: Hlavňová

Equally geotouristically attractive is the National Nature Reserve Šútovská Valley declared for the protection of biological and landscape significant area of Malá Fatra with preserved complex of typical Carpathian mountain forests and alpine character. In Šútovská valley there is the already mentioned Šútovský waterfall and several limestone quarries (Fig. 4). communities the nature reserve Veľká Lúčivná was declared in 1967 to protect natural forest communities with the richest occurrence of yew in Malá Fatra. Amongst the protection of fauna we can mention nature reserve Pod Rígľom, which was declared to protect the red ant and its rarity grouping of nests in man-planted spruce vegetation (MŽP SR, 2013).

Fig. 4 Flooded quarry Šútovo
Photo by: Hlavňová

Cultural and historical conditions of the development of geotourism

Visit to Malá Fatra is also closely associated with the secondary offering of the mountains, which are presented, in addition to accommodation and food services, also by cultural and historical objects. On the territory of Malá Fatra there is the *Museum of the Slovak Village* in Martin, which is the largest ethnographic exhibition in the open air in Slovakia. From historic buildings the ruins of Strečno castle, Old Castle and Zniev Castle deserve attention. Strečno Castle is accessible to the public since 1995 after long-term reconstruction work. The attention of tourists is equally deserved by the *Slovak Bethlehem in Rajecká lesná* which is a unique Christian art national carving by craftsman Jozef Pekár from Rajecké Teplice. It shows work and crafts of the Slovak people, their national costumes, customs and way of life. A visitor of Malá Fatra can meet traditional crafts, costumes, folk customs and traditions in the typical traditional villages of Terchová and Zázrivá in the northern part of the mountain range. The village Terchová is famous for international folklore festival "Janosik days in Terchová" which is associated with folk traditions and customs in the mountains. Other famous events include: Terchovský Budzogáň, Cyril and Methodius Days, World Cup in cooking and eating sheep cheese dumplings, Farmyard horses. The

village also offers a visit to the *Museum J. Janošík,* enabling them a closer look at the life of the national hero Juraj Janošík (Hlavňová and Muchová, 2013). Terchová village is the starting point of several hiking trails - Jánošík holes, Small Rozsutec, Big Rozsutec, Brigand walkway, Chleb, Boboty, Sokolie, Poludňový Grúň, Janošíkovým Chotár (Podolák, 2008). The village of Zázrivá has already been famous for the production of lump cheese steamed in hot water and pulling into the shape of thread and then plaited into whip in the second half of the 19th century. Thanks to the skills of Zázrivá women and thanks to keeping the traditional recipe it was created an exceptional product - Zázrivá whip, which is the pride of the village and the region. The village has rescue station rehabilitation for injured and exhausted predators. The village of Zázrivá in partnership with Janošík Court offers its visitors the opportunity to visit the School of Production of Zázrivá whip, Fujarová School, School of Folk Dance, making bells. The village is the starting point for many hiking tours (Zázrivá, 2013; Jánošíkov dvor, 2013).

CONCLUSION

Identification of geo-objects in tourism as a potential for development of geotourism presents a multilateral issue in both the horizontal and vertical level supporting the development of tourism in specific destinations of geotourism. The primary aspect of further development of gotourism as an integral part of tourism, the explicit identification of geo-objects and their potential in the particular area, in order to increase the competitiveness. On a specific example of identification of geo-objects in the area of Malá Fatra a specification for support of geotourism that determines the competitiveness of a geotouristic destination was pointed out. After globalisation of information gained it is evident that each geotouristic destination has some potential, which can be used to support the further development of geotourism mainly determined by its geological and geomorphologic evolution. Taking into account all the specificities of a particular geotouristic destinations, which clearly includes the Mala Fatra mountain range, it is possible to construct a universally valid algorithm assessing the potential of geotourism, which in close interaction makes the overall competitiveness of a geotouristic destination for tourism in Slovakia .

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