

Revision of the "Assessment of attractiveness (value) of geotouristic objects"

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ABSTRACT

As the geotourism as relatively new part of natural and environmental sciences rapidly grows in last decades, many researchers have tried to define a method or model to set specific value of "geo-objects" in different ways. The aim of this paper is to review existing geosite assessment method proposed by Rybár (2010) and, based on this existing method, to define more applicable and easier to understand model of object evaluations which are attractive from geotourism point of view. Resulting evaluation score of this modified assessment method is more informative on the object features and gives more precise picture of the value of the geosites or geotourism attractive objects.

Key words: object, assessment, method, revision, geotourism

INTRODUCTION

Nature, landscape and its forms, and geological structure are the main elements on which all the aspects of natural environment and the life within depend. Natural objects or locations and their features, such as geological structure or relief forms, are often a part of world heritage. Protection and conservation of these places can ensure that future generations will have the possibility to learn about geological history of Earth, study it and admire beauties of the nature.

Most complex coverage of this issue can be found within the concept of geotourism covering several aspects and approaches from many different fields (e.g. geology, geomorphology, tourism, management, economy, etc.). From geotourism point of view, locations with some geotourism potential are geosites. According to Reynard (2004), geosite is "portion of the geosphere that present a particular importance for the comprehension of Earth history. More precisely, geosites are defined as geological or geomorphological objects that have acquired a scientific (e.g. sedimentological stratotype, relict moraine

representative of a glacier extension), cultural/historical (e.g. religious or mystical value), aesthetic (e.g. some mountainous or coastal landscapes) and/or social/economic (e.g. aesthetic landscapes as tourist destinations) value due to human perception or exploitation."

Understanding the importance of geosites as the abiotic part of the environment brought several authors (e. g. Warszyńska, 1970, 1974; Wimbledon et al., 2000; Tucki, 2004; Pereira et al., 2007; Reynard et al., 2007; Zouros, 2007; Kubalíková, 2009; Rybár, 2010; Baca & Schuster, 2011; Bruschi et al., 2011; Poirier & Daigneault, 2011; Fassoulas et al., 2012; Kubalíková, 2013) to the idea to set their specific value. However, there is no evaluation method used universally and/or respecting expectations of "general" geotourists and not only scientists (Štrba et al., 2015).

This article is focused on revision of quantitative geosite assessment method proposed by Rybár (2010). After four years of practical application of this method, experiences and results show that this assessment method, which results are relatively easy to understand, requires revision when considering more complex or

universal application of this method.

OVERVIEW OF ORIGINAL ASSESSMENT APPROACH ACCORDING TO RYBÁR (2010)

Geosite assessment method proposed by Rybár (2010) is a quantitative assessment method giving specific score (“value”) of each assessed site. That means that after application of this method on any geosite

you will receive a number of points reflecting geosite value. The nature of this method is in assessment of each object from two points of view: (1) assessment of the object as a natural object, and (2) assessment of the object as an anthropogenic object. Both views have ten evaluation categories (criteria) with specific pre-determined evaluation assessment options and points (tabs. 1, 2).

As the author summarizes in the

Tab. 1 Assessment of the site as a natural object (Rybár, 2010)

Category	Assessment options	Pts.
Primary geological properties	Object is a part of geopark listed in European Geopark Network	8
	Object listed in international geosite network	8
	Object is a part of geopark	6
	Object listed in national geosites network	6
	Object not listed in any geosites network, but due to its character should belong there	5
	Object of local importance	3
	Other object	0
Uniqueness	Object unique within Europe	8
	Object unique within the Western Carpathians	6
	Object unique within orographic unit	5
	Object unique within hiking distance	4
	Object typical for region	3
	Other object	0
Object accessibility	Comfortable access	8
	Accessible for a person with average fitness condition	7
	More difficult - passing high elevation - steps, ladders	5
	Very difficult - specialized guide, or a need for special training;	4
	Protected area with limited freedom of movement Inaccessible for different reasons	0
Existing scientific and professional publications	Scientific and professional geological literature	8
	Map records only	4
	Locality without description	0
Conditions of observation	Suitable	8
	Difficult	4
	Unsuitable	0
Security criteria	Object, surroundings safe	8
	Object, surroundings secured by security elements, protection tools at disposal	5
	Object, terrain in dangerous environment, without security elements	0
Information availability on the object	Available and quality information on the internet	8
	Existence of educational-popular form of information	6
	Existence of scientific form of information	5
	Incomplete information Missing information	2 0
Visual value of the object	Object in mountainous landscape with great distance and depth views	8
	Object in plain landscape with great view	6
	Object in landscape with no view on its surroundings	3
	Object with view on man-made works negatively affecting one's perception	0
Value of provided services	Study room with library and laboratories for research purposes within the object	8
	Accommodation and catering offer	7
	Stores selling minerals, historical objects, books and advertising objects	6
	Presence of conference rooms	5
	Offer of accommodation for large groups, of just of refreshment	4
	Other services	2
	Object with no provided services	0
Object in tourist area	Object marked on maps, underpinned by marketing	8
	Object visited by holidaymakers	5
	Object "along the road" between two locations visited by tourists	3
	Object not underprinted by marketing	0

Tab. 2 Assessment of the site as an anthropogenic object (Rybár, 2010)

Category	Assessment options	Pts.
Age	Object from prehistoric, ancient or Roman age	8
	Medieval object	6
	Object from period between 16 th – 19 th century	5
	Newer object	3
	Newly established object	0
Historical value	Object as a part of set of technical monuments – building complexes, “tajchy” lakes, set of technical monuments in a limited area	8
	Individual object documenting mining activity – knock tower, adit mouths, winding machines	7
	Mining museum, open-air mining museum, mining archive	7
	Object related to historical mining activities	6
	Other historical object	3
	Object with no historical value	0
Aesthetic value	Architecturally preserved works (house, mansion, church, archeological findings)	8
	Object in beautiful natural environment	6
	Aesthetical reconstruction of mining settlement, set of objects	5
	Technical monument with aesthetic value	3
	Object with no historical value	0
Authenticity	Preserved authentic elements and details (buildings, technical works and objects)	8
	Museum or open-air museum with authentic technical monuments	7
	Archaeological findings documenting usage of mining or processing technologies	6
	Mining archive and library with number of authentic historical mining maps and mining literature	6
	Authentic object of mining technology	5
	Models, panels and copies of authentic technologies and objects	3
	Other	0
Value of municipalities and cultural routes reconstruction	Cultural route connected to mining activity	8
	Reconstructed mining municipality	6
	Reconstructed parts of mining municipalities	4
	Not reconstructed mining municipality	3
	Other objects	0
Excellence	Listed in UNESCO World Heritage List	8
	Object exceptional in European measure	7
	Object present in notable written and pictorial works documenting the history of mining	6
	Object important in historical ore area	5
	Object typical for selected mining area	3
	Other object	0
Emotional value	Object related to famous person or event of global/international/national significance	8
	Object visited by foreign tourists due to reverence for their native or hero	6
	Object related to historic figure or even of Slovak national significance	4
	Object with no emotional value	0
Utility value	Multifunctional object adjusted to needs of geo and montane tourism	8
	Object connected to presentation of geo and montane tourism	7
	Mining museum, open-air museum, mineralogical collections, mining archive, unique library of historical mining books	6
	Object offering historic services – mining canteen, mint, etc.	5
	Other object	0
Value of provided services	Tour down the historical mines	8
	Demonstrations of old technologies – gold cradling, flint chipping	7
	Multifunctional virtual mining – presentation	6
	Visit to operational mining works – demonstrations of modern technologies	5
	Lectures of mining, mineralogy, petrography, paleontology, social development of mining, famous persons in mining, mining law, etc.	4
	Store selling minerals, historical objects, books, and advertising objects	3
	Other services	2
	Object with no provided services	0
Safety criteria	Object safe, requiring no safety measures	8
	Object fully secured by services provides	7
	Object secured, protection tools not provided	5
	Short training provided	3
	Object without provided safety services	0

conclusion, the value of each assessed object is then given by a pair of numbers representing its natural/scientific and anthropogenic value. The highest score is 80/80 meaning that object was assessed in all categories with the maximum "8" point rate. The value 80/0 means that an object has the highest possible value from the "geo" viewpoint, but zero value expressing "mining" part of assessment. Vice versa, the value 0/80 indicates that an object has no "geo" value, but has maximal technical and historical "mining" value. Assessment with two numbers close to 80 marks an object with exceptional geotourist and mining value. Assessment with numbers close to zero means that an object is not of great geotourist value (Rybár, 2010; Rybár et al., 2010).

DISCUSSION ON THE ORIGINAL METHOD AND ITS REVISION

One of the most discussed features of the method is the fact that each object or location is assessed according to two individual tables – as natural and anthropogenic object. This original approach has one weakness. Many natural objects cannot be, or with many difficulties, assessed according to criteria given within *assessment of the site as an anthropogenic object* (tab. 2). As the criteria within this part of assessment are primarily proposed for mining heritage sites (e.g. mines, quarries), their application on many natural sites is impossible if we want to have representative assessment score of the site. In light of this fact, following text will discuss only the first part of original assessment method - *assessment of the site as a natural object* which can be used for the variety of geosites.

Closer look on the method of Rybár (2010) reveals that original approach of natural object assessment is relatively locally based to Europe and the territory of the Slovak Republic or Western Carpathians. It is reflected in several

assessment criteria (tab. 1) – *Primary geological properties: Object as a part of geopark listed in European Geopark Network, Uniqueness: Object unique within Europe or Western Carpathians*. To be universally applicable, an assessment method should include criteria that can be used on each geosite on the world, therefore we assume that these criteria should be more generalized, as proposed in revised version of the assessment method (tab. 3) which takes in account, besides Europe and Western Carpathians, other parts of the world and other mountain ranges.

After several years of application of this method, primarily on geosites located in Slovakia, experiences show that there are many misunderstandings resulting from names of some assessment categories or criteria. Here, mostly discussed are *primary geological criteria, existing scientific and professional publications, and information availability on the object*. First mentioned category reflects classification and evaluation of geosite according to its membership in geopark or geosite network. So, it can be assumed that this category evaluates general classification from the geotourism point of view (tab. 3). According to the knowledge of authors, this is the only geosite assessment method including such category. One can argue that this category is unnecessary and prefers sites located within geopark and/or belonging to geopark or geosites network. But on the other hand, as the practice and experiences show, lone standing, well preserved and unique locality with no or weak geotourism background and management is often out of the scope of general public. Also, locations with geotourism background are more protected and well preserved for future generations because of their regular monitoring and measures applied at the site. Therefore, we assume that this category and criteria within are, at least for general public and site protection, important component of the assessment method. *Existing scientific and professional publications and information*

availability of the object are two partially overlapping categories. Unification of them may eliminate possible uncertainties within assessing.

Considering complexity of discussed assessment method, one important category is missing. No matter what kind of evaluation method is used, either quantitative or qualitative, category representing integrity or current state of the

site should be included into the assessment, because, in many cases, it is a crucial criterion to visit an individual location for both main groups of geosite visitors professionals and general public. Also, overall attractiveness of the site depends on the degree of its preservation. As original method (Rybár, 2010) does not comprise such category, we suggest to include a new category *degree of preservation* in revised

Tab. 3 Geosite assessment after revision of the method proposed by Rybár (2010)

Category	Assessment options	Pts.	Ratio
General classification (C ₁)	Part of geopark listed in EGN/GGN or listed in international geosites network	8	1.00
	Part of geopark or listed in national geosites network	6	0.75
	Not listed in any geosites network, but due to its character should belong there	4	0.50
	Local importance	2	0.25
	Other	0	0.00
Uniqueness (C ₂)	Unique worldwide	8	1.00
	Unique within continent	6	0.75
	Unique within orographic unit	5	0.67
	Unique at national level	4	0.50
	Typical for region	2	0.25
Other	0	0.00	
Degree of preservation (C ₃)	No destruction	8	1.00
	Mostly preserved, some details destructed	6	0.75
	General features preserved, partial destruction	4	0.50
	Mostly destructed	2	0.25
	Totally destructed	0	0.00
Accessibility (C ₄)	Comfortable access	8	1.00
	Accessible for a person with average fitness condition	6	0.75
	More difficult - passing high elevation - steps, ladders	4	0.50
	Very difficult - specialized guide, or a need for special training;	2	0.25
	Protected area with limited freedom of movement	0	0.00
Inaccessible for different reasons	0	0.00	
Study/observation conditions (C ₅)	Excellent	8	1.00
	Normal	5	0.66
	Difficult	3	0.33
	Unsuitable	0	0.00
Security criteria (C ₆)	Object, surroundings safe	8	1.00
	Object, surroundings secured by security elements, protection tools at disposal	5	0.66
	Object, terrain in dangerous environment, without security elements	0	0.00
Information availability (C ₇)	High quality open-access information available on the internet or at the site	8	1.00
	Educational-popular form of information or publications	6	0.75
	Scientific "geo-based" form of information or publications	4	0.50
	Incomplete information	2	0.25
No information	0	0.00	
Visual value (C ₈)	Object in mountainous landscape with great distance and depth views	8	1.00
	Object in plain landscape with great view or inside cave	6	0.75
	Object in landscape with no view on its surroundings	3	0.33
	Object with view on man-made works negatively affecting one's perception	0	0.00
Value of provided services (C ₉)	Study room with library and laboratories for research purposes at the site	8	1.00
	Accommodation and catering offer at the site	6	0.75
	Stores selling minerals, historical objects, books, advertising objects, local products	4	0.50
	Other services	2	0.25
No provided services	0	0.00	
Tourism importance (C ₁₀)	Marked on tourist maps, underpinned by marketing; strong connection of geosite to cultural/historical features of the area	8	1.00
	Partially connected to cultural/historical monument(s)	6	0.75
	Visited by holidaymakers	4	0.50
	"Along the road" between two locations visited by tourists	2	0.25
Not underpinned by marketing, no tourism importance	0	0.00	

version of the assessment method. Here, five assessment options are proposed: no destruction; mostly preserved, some details destroyed; general features preserved, partial destruction; mostly destroyed; and totally destroyed.

Revised assessment method (tab. 3) includes ten categories representing complex characterization of locality from geotourism point of view. Although there are many geosite assessment methods defined, only few studies (Kubalíková, 2013; Štrba et al., 2015) devoted to comparison of these methods have been written yet. Results of these comparisons show that there are criteria which should be implemented within any evaluation process. Kubalíková (2013) grouped assessment criteria into following five groups: (1) scientific and intrinsic values, (2) exemplarity and pedagogical potential, (3) accessibility and visibility of the site and the presence of tourist infrastructure, (4) existing threats and risks, assessing conservation activities or the existing legislative protection of the site, (5) added values. According to Štrba et al. (2015) key criteria for geosite assessment include: rarity, representativeness, integrity, accessibility, ecological value, and economic value. Comparison of these suggestions with proposed revised

assessment method is given in table 4.

As the assessment is defined as method which results can be used by both, professionals and general public, overall assessment score includes five different values.

First value is represented by the total sum of points from each category. Here a maximum of 80 points is possible to gain. Each assessment option within individual category has its own percentage (tab. 3). So, final score is possible to express not only via points but percentage also. It may help to clarify assessment results because percentage is more representative value for many people, predominantly laic individuals from general public. Final percentage (FP) is an average of percentages gained from individual assessment categories, as follows:

$$FP = \frac{\sum_{i=1}^{10} C_i}{10} \quad (1)$$

Besides this total geosite score, several additional scores can be derived from the assessment method. As the assessment includes different-type categories, scientific, educational, economic, and added value of the geosite can be specified after the assessment process. Scientific value is given the sum of categories which are important from study

Tab. 4 Comparison of revised assessment categories with research results of Kubalíková (2013) and Štrba et al. (2015)

Assessment category	Assessment group according to Kubalíková (2013)	Key criteria according to Štrba et al. (2014)
general classification uniqueness	added values scientific and intrinsic values, exemplarity and pedagogical potential	representativeness (partially) rarity
degree of preservation	existing threats and risks, assessing conservation activities or the existing legislative protection of the site	integrity
accessibility	accessibility and visibility of the site and the presence of tourist infrastructure	accessibility; ecological value (partially)
study/observation conditions	accessibility and visibility of the site and the presence of tourist infrastructure	representativeness (partially)
security criteria	added values	-
information availability	exemplarity and pedagogical potential (partially), added values	-
visual value	accessibility and visibility of the site and the presence of tourist infrastructure, added value	-
value of provided services	added values	economic value
tourism importance	accessibility and visibility of the site and presence of tourist infrastructure, added values	economic value

and research point of view for different kind of scientists. These categories are covered by: uniqueness, degree of preservation, information availability, and study conditions. Uniqueness here is important, as characterized by other authors (e.g. Wimbledon et al., 2000; Reynard et al., 2007; Štrba et al., 2015), because the knowledge of its value helps to identify rare locations which often are allurements for many researchers in order to study unique natural phenomena. Study conditions and degree of preservation are closely connected categories within scientific value of the site. Unique location with inappropriate study conditions or damaged site, in general, offers limited research conditions resulting into lower scientist interest in such types of locations. Availability of information on the locality and the type of information represents scientific value of the site because the more scientifically significant location is the more publications are available.

Educational value of the geosite is a sum of score from uniqueness, information availability, accessibility, provided services and study conditions. Importance of uniqueness, study conditions, and information availability within this value is similar to previous value. When considering educational character of geosite, accessibility is one of the most important categories within this value. Inaccessible places (from different kind of reasons) provide no or just little education opportunity and lose their importance within the process of field education of not only geoscience students but all the students which studies are related to the environment. Value of provided services represents here overall background for educational purposes.

Economic value represents benefits, primarily financial profit, resulting from locality character and its background. The value is given by the sum of scores from general classification, provided services, tourism importance, and accessibility. As summarized by Kubalíková (2013),

economic value fulfills two geotourism principles (tourist satisfaction, community involvement and benefit) mentioned in definitions of National Geographic Society (2005) and Newsome and Dowling (2010).

Added value represents overall tourism potential of the area including such factors like presence of touristically attractive cultural and/or historical monuments, accommodation and catering offer or emotional perceptions (predominantly given by visual value, provided services and security) of visitor. The final score of this value is the sum scores from categories of visual value, tourism importance, provided services and security. Although it is quite difficult to assess aesthetic character (visual value) of the place and in many cases it is strongly subjective based, it significantly affects satisfaction of tourists and therefore is included into the assessment.

Comparison of original and revised assessment method

Proposal of any assessment method that should be used practically requires some example(s) of practical application what may be used as some kind of manual for potential users. Following text brings assessment of geosite Dreveník, including general characteristics of the site, using original method of assessment of attractiveness of geotouristic objects proposed by Rybár (2010) and revised assessment method presented in this paper.

Dreveník (Fig. 1), as one of the biggest travertine hills in Slovakia and Central Europe, is located in the Hornádska kotlina Valley, near town of Spišské Podhradie. This site, law-protected from 1925, was inscribed of UNESCO's World Heritage list in 1993 (SAZP, 2007). Remnants of human settlement of Neolithic age were found here. From geological point of view, Dreveník travertine hill, originated from junction of several travertine heaps, was formed from mineral springs at tectonic fault. According to Tulis and Novotný



Fig. 1 Travertine blocks of Dreverník

(2008), the thickness of travertine deposits, which overlay flysch deposits of the Central Carpathian Paleogene Basin (Gross et al., 1999), does not exceed 75 meters. Results of paleontological studies suggest (Tóth and Krempaská, 2008) that the age of the travertine is considered to be Pliocene. Erosional processes (karstification and gravitationally induces mass movements) extensively destruct travertines (Tometz, 1997; Wróblewski et al., 2010). Due to its diverse character, findings and observable features and/or processes, described geosite may be a place of interest for scientists and laics of different fields, like general geology, sedimentology, engineering geology, palaeontology, history, archaeology, botany, etc.

Before comparison of results it is necessary to mention that, using original method of Rybár (2010), selected geosite was evaluated only as a natural object. Approach of site evaluation as anthropogenic object was not applicable.

Assessment results show that using original method (Rybár, 2010) the geosite has 58 points and using revised version of assessment method it has 53 points (67%). As the maximum scores of both assessments are the same (80 points), the 5 point difference may primarily result from the fact that original method gives twice 8 point score within two different categories (existing scientific and professional publications, information availability on the object) that were unified in revised version. Also, in revised version, the same or similar categories have lower point score in some cases (e. g. object accessibility vs. accessibility). In general it can be said that revised assessment method provides more complex characteristics of the geosite. Addition of percentage into the assessment makes the results of this method more “public-friendly” because such presented value is easier to understand for many individuals not only from general public but professionals too. Furthermore, specific

scores of scientific, educational, economic and added value (Tab. 5, Fig. 2) characterize the site from different point of views and give more complex picture of the geosite potential. Results clearly indicate

that Dreveník is mostly scientific like locality with potential to become complex geosite of international importance after abolishment of shortages (e.g. provided services) which the assessment pointed out.

Tab. 5 Comparison of results according to original assessment method (Rybár, 2010) and proposed revised method

Rybár (2010)			Revised assessment method			
Category	Assessment	Pts.	Category	Assessment	Pts.	Ratio
Primary geological characteristics	Object not listed in any geosites network, but due to its character should belong there	5	General classification	Not listed in any geosites network, but due to its character should belong there	4	0.50
Uniqueness	Object unique within The Western Carpathians	6	Uniqueness	Unique within orographic unit	5	0.67
Object accessibility	Accessible for a person with average fitness condition	7	Degree of preservation	Mostly preserved, some details destructed	6	0.75
Existing scientific and professional publications	Scientific and professional geological literature	8	Accessibility	Accessible for a person with average fitness condition	6	0.75
Conditions of observation	Suitable	8	Study/observation conditions	Excellent	8	1.00
Security criteria	Object, terrain in dangerous environment, without security elements	0	Security criteria	Object, terrain in dangerous environment, without security elements	0	0.00
Information availability on the object	Available and quality information on the Internet	8	Information availability	High-quality open-access information available on the internet or at the site	8	1.00
Visual value of the object	Object in plain landscape with great view	6	Visual value	Object in mountainous landscape with great distance and depth views	8	1.00
Value of provided services	Object with no provided services	0	Value of provided services	No provided services	0	0.00
Object in tourist area	Object marked on maps, underpinned by marketing	8	Tourism importance	Marked on tourist maps, underpinned by marketing; strong connection of geosite to cultural/historical features of the area	8	1.00
Total		56	Total value		53	0.67
			Scientific value		27	0.84
			Educational value		27	0.68
			Economic value		18	0.56
			Added value		16	0.50

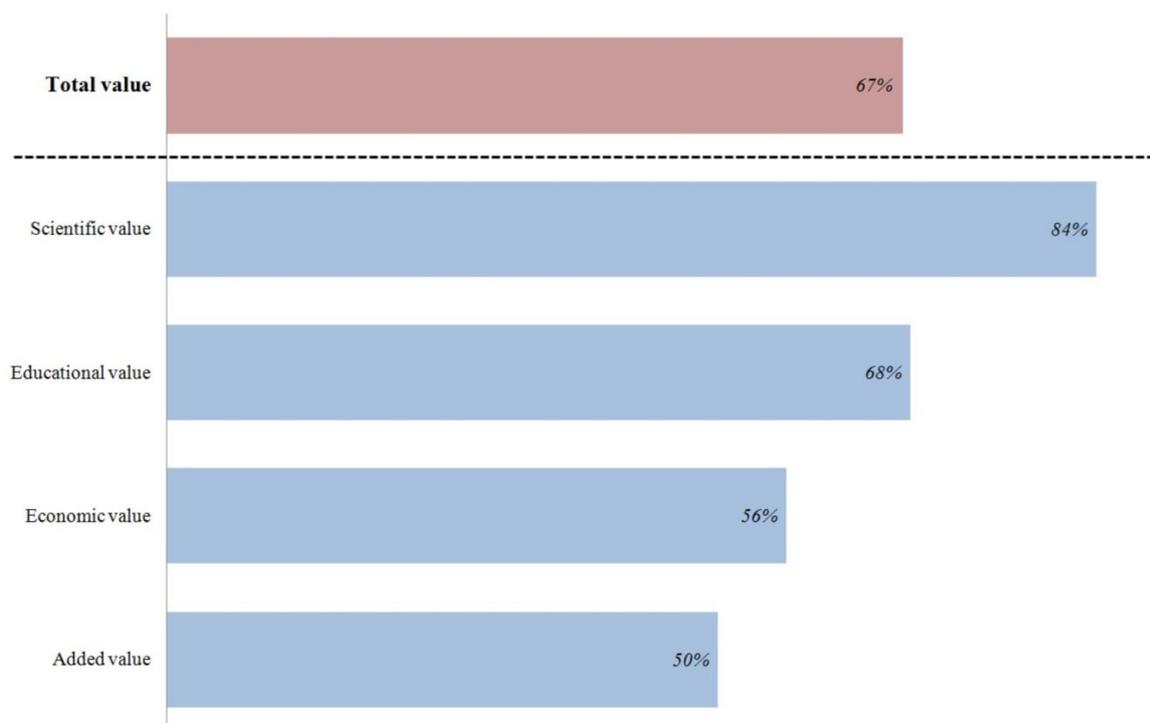


Fig. 2 Graph results of proposed revised assessment method

CONCLUSION

As the concept of geotourism continuously develops, many scientists define or modify different kinds of methods of geosite assessments in order to set specific value of natural objects as one of primary points of interest within geotourism. Geosite assessment method defined by Rybár (2010) was discussed and revised in this paper. As original method includes assessment of each site as natural and anthropogenic object where second part was often not applicable (due to its primary orientation on mining heritage sites), it was removed from revised version. Comparison of results of original and revised version shows that revised version provides, via total, scientific, economic, educational and added values, more complex overview of geosite value and potential and is more understandable to wide range of people.

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