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Historical mining areas in the context of mining tourism

Geotourism and mining tourism, under certain conditions, can become a significant economic base of regions in which objects of geotourism are present, but it is necessary to devote more attention to the tourism aspect. Within the mining tourism, there are worldwide known and mass-visited mining objects in many countries. However, mass mining tourism can also be realized in locations that, (1) recently, are less known and/or less accessible to general public, or (2) include mine remnants accessible only at short distances or without underground access possibility, due to the protection of specific animal species. This article is focused on the mass tourism in such types of mines and mining areas.

Keywords: geo and mining heritage, mining tourism, historical area, mass tourism

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Introduction

Many of geotourism related papers that have been published yet are focused on characterization of geosites and their categorization (e.g. Bruno et al., 2014; Štrba, 2015; Aldighieri et al., 2016; Giuliano & Manzo, 2016).

Visitor rate at geosites often reaches incomparable lower number than at places visited by tourists within other forms of tourism, in well-known and popular tourist regions.
We are sure that geotourism can become one of the major parts of the regional economic base in the areas where geosites are located. It is time to realize not only "geo" part of the geotourism but 'tourism' also. It means that we should not only describe the potential but also utilize it through successful promotion and mass-geotourism realization.

Recently preferred characterization of geosites is mainly addressed to individuals (professionals and laics) or small specialized groups and organizations, e.g. schools or conference participants. People interested in geosites and geotourism mainly comprise professionals in the field of geology, mineralogy, paleontology, ecology, geomorphology, but also photographers, filmers, collectors or, what is a pity, vandals, and despoilers. To achieve that geotourism will be an economically interesting form of tourism which satisfies specific needs of (geo)tourists (domestic and foreign), it should be organized in the way to be able to preserve specific (often unique) features of natural and anthropogenic objects of geotourism importance. Offered services, compared to standard services of classic tourism, should be enriched by elements of nature and technical monuments protection and by the possibility to realize research of these objects.

This paper is focused on mining tourism (e. g. Conlin & Jollife, 2011; Kršák, 2011; Lopez & Perez, 2013; Perez-Alvares, 2016), which as a part of geotourism (Rybár et al., 2010; Timčák et al., 2011) should also respect above mentioned suggestions to become popular and sustainable form of tourism.

Mass mining tourism at famous mining locations

The best way to define the term "mining tourism" is to separate the words „mining" and "tourism", which both are relatively easily to characterize.

Organized form of massively and long-term visited underground places is realized in many caves or mines which are visited by general public respecting the rules for visiting. Examples of such places can be found in many counties, e.g. Poland (Wieliczka mine), Slovakia (the city of Banská Štiavnica), Austria (Hallstatt), Germany (Rammelsberg), Czech Republic (Kutná Hora), Romania (Salina Turda), etc. These places are an example of

successful realization of mass mining tourism in central Europe. Here, in most cases thanks to the guidance, the visitor acquires knowledge of visited object from several points of view and visited object is protected. Neither of these is not one hundred percent. But, it helps to offer the most attractive parts of the object to the visitors, to assure vistors'safety, to provide information on visited object, history of the mining region etc.

Interesting source of information can also be some facts related to the mining heritage – presence and influence of famous personalities and families affecting the progress and development of mining and metallurgy in specific regions, development of natural and technical fields of science influenced by the mining activity, existence of mining schools in the region, development of mining towns, etc. For many tourists, information connected to the original meaning of the term geotourism is important, including geological structure of the area, geological, mineralogical, paleontological and geographic features of visited site.

For defined mining related underground tourist paths, it is important that these paths should be clearly marked, safe, attractive - to satisfy tourists 'curiosity. This depends on the management of the objectwhich should be aimed on sustainability of the visit rate. Management should also precisely determine when and how make accessible underground paths, how to make more attractive existing paths, meeting the underground security criteria of visited mine.

Realization of mining tourism in the area with spread relicts of historical mining

Countries of the middle Europe with their unique mining heritage dispose of many regions with a large number of historical mining relicts. How to identify such relicts within specific region? Is it necessary to protect them against undesired visit of vandals, collectors, or occasional adventurers by not releasing their real position in the field? Is it suitable to characterize their historical value or not? How is it possible, in such case, to organize attractive mass mining tourism in the region?

Within mining tourism, visited objects can include recently more or less known historical mining objects, or spread (dispersed) relicts on relatively large area. Such objects are less accessible or inaccessible, and often are not suitable for mass visits, taking into account their current status. In many cases, these objects are accessible only on short distances, or are flooded, swamped, or with no possibility to enter the mine, e.g. due to the protection of specific species present at the site. Such mines or their relicts are the subjects of documentation, research and underground mapping on one hand, but on the other hand, they often are places of uncontrolled adrenaline activities or buckeying.

To realize mass mining tourism under such conditions with contemplation of economic development of the region, it is necessary to propose integrated projects with the support of pilot (example) projects, which will demonstrate and analyze return on investments within expected time. After this time, the ration of financial participation of external sources must begin to shrink and the ratio of own sources must rise, resulting from successful implementation of the project.

Project of mass visited region with spread objects of mining heritage

Try to imagine project that would be an example (model) for projects proposals with similar intention – support of mining tourism development in the area with spread objects of mining heritage.

Project objectives

Project proposal of mass visited region with spread mining heritage should clearly define its objectives. It is necessary to know what, to whom and why to offer and what and how should be protected.

In the beginning, it should be recognized that the project with the offer of individual spread relics of mining in relatively large region is economically doomed to failure in advance. Such project should include attractive paths connecting mining heritage objects, meeting tourist expectations, e.g. via attractive forms of transportation, quality local dishes, adrenaline and other standards that can be offered to visitors at natural sites.

Plan of the project

The plan of the project should take into account specificity of the final product. It must address both general and specific criteria:

- Main objectives of the projects,
- Selection of the region with the perspective of mass visit rate,
- Legal aspects related to the project implementation,
- Economic evaluation of the project,
- Organizational conditions of the projects,
- Transport and services,
- Social aspects of the project,
- Environmental protection and sustainable development,
- Visitor's safety,

- Project development – innovations, meeting expectation of visitors, safety, attractiveness and project attractiveness improvements,
- Bonus – geosite, geopark, national park, big town, enlisted the UNESCO World Heritage List, mining heritage – cultural heritage, industrial heritage, etc.
- Project assessment

Principles and specifics of project proposal of mass visited region with spread objects of mining heritage are discussed in the following text.

Legal aspects related to the realization of the project

Legal subject realizing the project should co-operate with local and regional authorities and organizations interested in the region right from the start of the project objectives definition. Moreover, most of the countries have their own legal norms on the rules of the movement and behavior of visitors in underground areas.

	Visitors Mines	**Research Mines**	**Mines in Operation**
Applicable Law	Mining Law		Mining Law, Industrial Law and Regulations
Additional Law	Regulations for Public Events		
Main Purpose	Tourism	Mining Research	Mining

Table1: Application of Law at realization of mining tourism in underground mining object (after Drebenstedt et al., 2011, modified by authors)

Type of Mine	Intention
Visitors Mines	- Mining Museum, Exhibition - Being Underground Adventure - Touristic Activities Underground
Research Mines with guided Tours	- Demonstration of Research - PR for Research Institute - Using as Visitors Mine
Mines in Operation with guided Tours and sportive Activities	- PR for Mining Operation - Access to Geological Activities - Touristic / Sportive Activities

Table 2: Various law statuses of visiting mines (after Drebenstedt et al., 2011, modified by authors)

Economic background of the project

The basic starting point is the acceptance of the principle of the supply and demand. In historical mining regions, which include most of the middle Europe, there is a big overpressure at the side of (potential) supply. Demand should often be stimulated by massive and well-aimed marketing. Besides professional-quality promotion aimed on specific target groups of population, both at home and abroad, interest and pride in the history of the region with special emphasis on existing mining heritage, as well as existing geotourism elements in its "classical" form, should be awaken.

It is probably that emergent political, social and safety situation in the territory of Europe will negatively affect the number of tourists in the Mediterranean area during the main holiday period and thus the domestic tourism demand will increase. Needs of Europeans to travel and spend their free time by hiking, and exploring something new are actual also in such situation. It can be assumed that this type of free time spending of a Middle-European has become some kind of necessity of life. Seemingly, more attention will be paid on domestic tourism. Therefore, now is the right time to enrich the tourism offer by the mining tourism.

Economic background of the project

The project should be proposed and realized that the pay back period will be 5 to 8 years. In following years, the project must be able to produce funds to reduce gradually the ratio of external investments needed for innovations, safety, attractiveness and competitiveness improvements. Project implementors must the able to manage and develop the project in order to sustainably meet visitors 'expectations. Here, co-operation with organizations including universities, scientific institutes or mining guilds is highly recommended. In addition to the mining tourism experience, each costumer should have fulfilled his/her basic expectations with regard to accommodation, catering, logistics and expected attractions for different groups of potential visitors. Possibility to organize conferences, meetings and field trips should also be considered. The project should be prepared for both groups and individuals.

Incorrect estimation of the target number of visitors at the end of the planned phases of the project most likely brings serious economic problems. A significant overestimation of the number of visitors may result in unnecessarily high investments, low incomes and prolonged pay back period. It also may cause significant financial losses to investors and loss of the public trust in efficiency of such type of project. On the other hand, significant underestimation of the number of visitors may result in serious problems with environmental protection and preservation of mining heritage. Problems can also occur in transport and social spheres.

Organizational aspects of the project

The project should reflect the territorial extent of selected area. The project can be realized by one or several organizations with legally defined competencies. Tourist organization can manage the whole project and retain just some competencies, and use services of other subjects offering and/or providing accommodation, catering, transport of visitors, guidance, environmental protection, reconstruction and maintenance works, etc. Another possibility is that whole project will be realized by one organization or company covering all services that are required.

The customers will obtain an offer of a complete package of services at the place of the first contact, e. g. at the entrance to the area. From the project implementor point of view, it is important to know the organization of the work, e.g. if the visitor is guided doing the whole visit, or if the visitor should follow marked tourist trails with individual guides on each trails/attractions. In the second case, more patrolmen are required to ensure the protection of

the area of mass mining tourism. In case that visitor mine is located in the area, modification and safety of underground sites, as well as the visiting rules, should be subordinated to respective mining office and should follow mining act. The relationship between organizations realizing mining tourism is explained in table 3.

	Visitors Mines	Research Mines	Mine in Operation
Responsibility for Safety of Tourists	Visitor-Association	Research Institute	Mining Company
Access and Location in Mine	Main Access whole Mine	Main Access special Routes	Extra Access selected points mostly closed part of the mine
Tourism Guides	Association-Staff (Casual Worker, Volunteers)	Organized by Research-Institute (Staff trained by Mine) - Organized by Mine Tour Company (Tourism Guides)	Organized by Mining-Operation (Staff / retired workers trained by Mine) - Organized by Mine Tour Company (Tourism Guides)

Table 3 Responsibility for the safety of tourists and organization on tourist movements in the visitor underground mines

Common organization and realization of mining tourism:

- in Visitors Mines is very common,
- in Research Mines is Speciality (belonging to individual conditions),
- in Mining Operations (mostly organized by the outsourced company).

Common way how to organize mining tourism in Mine in operation is:

- establishing of Tourism Association,
- defining a border between „Mining Operation“ and „Visitors Mine“ organized by PR-Office of Mining Operation.

Operative plans for visiting mines and caves submitted to approving and supervising authorities should contain:

- general information (owner, operator, number of visitors, opening time, duration of tours),
- a brief description of responsible people,
- organization of visits (number and education of guides, program and routes of guided tours)
- mining operating information (maps, accesses, geotechnical safety, ventilation, lightning, electric system)
- safety (fire prevention, first aid, emergency management) and controlling (documentation of test: mine support, equipment, electric system) (Drebenstedt et al., 2011).

Transport and services

From the whole portfolio of tourism logistics, we will focus only on the transport, especially transport of tourists within the areal, as the transport within the Europe, is well defined. Construction works, and/or reconstructions will be required only at short distances within deviated routes leading to individual attractions, and to build new parking areas.

Transport within selected regions can be realized via horse rides, horse-drawn carriages, cable cars, bicycles, or motor vehicles. In the case of mass visits of flooded underground mines, boats can be used. A special case is a visit of active open-pit mines, where visitors are transported by trucks modified especially for this purpose. In plain areas with suitable roads, tourist trains with wheel chassis can be used.

Modifications and/or reconstructions can also be required along tourist trails. Also, taking into account "mass" character of the project, it will be necessary to define and construct new trails, not only for tourists, but for bikers, horse riders and carriages also. Accessing underground sites may also require some construction works.

To create some kind of ranking of most important services that are crucial from the project proposal point of view, boarding possibilities take the first place, followed by the support of "auxiliary", mining tourism not directly related, attractions built along the visit route, including e.g. sport attractions. Museum visits, providing information by guides, selling of minerals, publications, maps and souvenirs, etc. can be very helpful to get more information and learn about the mining heritage value.

Other services, important for the successful realization of the project, are mentioned in other parts of the article devoted to the transport and organizational aspects of the project. The existence of accommodation possibility in the region, as one of the crucial services within other forms of tourism products, is a bonus in the type of project introduced in this paper. However, construction of large-capacity hotels, pensions or others is economic suicide in this kind of mass tourism project.

The social aspect of the project

Social aspect of the project is connected with the economic development of the project and region. In the phase of project implementation, as much as possible local work resources, especially former miners and manually skilled people, should be used. Such people can often be found in historical mining regions. Employment of former miners as guides in underground visitor mines may attract the visit, as their knowledge of the area and mining history is often more personal. So, successful mining tourism project is not only the economic engine of the region but may result into social development of the area also. Because each activity that generates new positions increases the level of the region, gives the signal to people not to leave the area, supports self-realization and personal development, impacts on local culture and other aspects that positively affect the region.

Environmental protection and sustainable development

Within mining tourism in sensitive parts of underground mines, where e.g. minerals occur under specific conditions (e.g. auripigment and realgar in some parts of the Dubník mines), it is suitable to adopt verified form of visit realizations and organizations, and object protection from cave visiting rules, which, besides organizational and economic aspects of the visit, also reflect the protection and preservation of underground sites by keeping specific conditions (temperature, humidity, light conditions, vibrations, etc.). Regulation of number of tourists visiting caves, frequency of individual entrances and tourist guides which also protect natural sites is good example how to organize and realize underground mining tourism, not only in places requiring high level of protection.

Frequent subject of underground sites protection is the presence of specific fauna. In such cases, closure of the whole object is the easiest, but not always the most suitable, way. It may result into status that instead of organized group of tourists moving within the underground mine with special emphasis on the environmental protection, individuals not respecting the closure with no interest in protection will visit the object, often because of plunder precious minerals.

To protect the environment at the surface within mining tourism region, the most effective is to employ tourist guides that will care about the tourist movements and behavior in situ. Even though there is no way of total protection, it can be assumed that most of the tourists respect visiting rules of the area when guided by some authority. Presence of guides also raises the safety level of visitors.

Some visitors also positively react to environmental measures applied within the project related to the cleanliness, renewable energy sources utilization, etc. Each visitor knowingly or unconsciously submits to requirements on sustainable development of the region. Effective investments on such measures should result in profit from ecological business (higher number of visitors, lower expenses on technical maintenance of mines and surface attractions, trails, safety enhancement, etc.).

Protection and safety of visitors

Safety and health protection of visitors is a primary precondition of successful project. It is connected to following the rules given by the Mining Act, which is primarily focused on the protection of human life and health. Conditions and rules of underground or surface visits and visitor movements should be defined in this regard. In underground, it is mainly ensuring safe movement in every part of the visitor mine. On the surface, attention should be paid on

good condition of tourist trails, ensuring safety on sightseeing places, fire protection at places with public fires, etc.

Each visitor should have accident insurance, covering stay in the nature. Before entering the underground or open-pit mines, visitors should be instructed in the underground mine movement and behavior

Development of the project in time

Monitoring of project indicators during the realization of the project means monitoring of deviations from planned state of things from the perspective of finances, terms and capacity, human and material resources, and project environmental impacts. Management should dispose of tools, helping to react on adverse development in time, to control and manage project indicators.

The project is realized within defined schedule, in which individual steps can be defines as follows:

1. Definition of project objectives, location selection, aims of the project, definition of target groups, selection of trails/paths and objects, priorities
2. Project design:
    a. Legal aspect of the business,
    b. Business economy,
    c. Environmental protection, safety and health protection,
    d. Social aspect of the project
3. Project markers
4. Control mechanisms of the project
    a. cash flow,
    b. new positions,
    c. transport infrastructure construction,
    d. the offer of services,
    e. visitor rate monitoring,
    f. ensuring the safety of visitors,
    g. requirements of the visitors not included into the project proposal,
    h. innovations,
    i. maintenance,
    j. environmental impacts.

Within the project timeline, in each moment, it is necessary to know when and how to continue in the project, or if to give up the project due to its economic unfeasibility. It should be mentioned that the activities defined above are mutually connected. Therefore, each new auction originally not defined within individual parts of the project may negatively or positively affect the whole project. For example, originally not defined and newly realized environmental measures surely financially burden on the project budget. The point is that this measures will positively affect visitor rate generating higher profits, e.g. in the horizon of five years or less.

Case study – the area of Dobšiná

Project objectives

a. To prepare preconditions for mass mining tourism via several thematically and regionally integrated projects respecting different interests and physical abilities of potential visitors in historical mining region
b. To prepare project with minimal negative impacts on nature and visited man-created technical objects/sites
c. To prepare a project with the year-round operation and expected visitor rate of 3000 to 5000 tourists per year. This number should be reached within the first five years of the project existence.
d. Expected pay back period – up to 8 years. After this period, the project must produce sufficient funds for own operation and further development
e. Expected number of newly created positions: 20. Other, project induced positions will be created in the sector of services – market, transport, catering and accommodation.

Selection of perspective region

Dobšiná is located in the area of occurrence of gold, silver, copper and iron ore, which should have been "just" mined. As the deposits were located in places of good mining conditions, with an abundance of wood and water needed for the mining process, mining settlements were established here. Reach mining and business life flourished mainly in the Middle Ages. New colonists – mining experts, which brought new mining methods (underground mining), technologies and metal processing methods, came from Germany. The trading market developed, ores were exported into different countries, mining and metal processing related crafts, including mining, mining carpentry, metallurgy, metal founding,

were developed. In the second half of the 19th century, Dobšiná was the European center of nickel and cobalt ores mining.

Definition of the area in the region with spread relics of mining heritage

The reason of the area selection is that there are located historical and documented mines and mining works, as well as geotourist attractions and an abundance of an existing object of high historical value, representing historical mining heritage of the region. Also, another reason is the presence of personal background – people which remember active mining and are still interested in it.

Proposed paths / trails (Fig. 1)

Path A:

Start in the point 1 (Museum of M. Neubauer (Fig.2),

Point 2 -Vlčia dolina valley, visit of 300m long shaft Remeny (Ni-Co a Fe ores mining (Fig. 3)),

Point 3 – Lányi Iron-Mill, (a place of knowledge of famous family of Lányi (Fig. 4),

Point 4 - Gápeľ, numerous relics of historical copper mines – heaps, adits and shafts. This point is an entrance to the National Park Slovak Paradise. Point 4 is a crossroad of each of the three proposed paths (A, B, C).

Continuation of the path A:

Point 5 - Dedinky- village at the shores of water dam Palcmanská Maša (Fig. 5), bounding the Geravy Plateau from the south. It is relatively good connection with its vicinity, accessible by car, bus and train (railway Zvolen – Margecany, fast train station), accommodation and catering services, boat and ski equipment rentals, popular tourist location – NP Slovak Paradise, fishing, water sports at the dam, skiing in the Dedinky, Mlynky village, chairlift Dedinky – Geravy, and rafting on the Hnilec River. End of the path A.

Path B:

Points 1-4 are the same as in Path A.

Point 6 - Hanesová (Hanisej meadow), large plateau, peak: Hanisej 1095 a.s.l. Part of the plateau is located in the National Nature Reservation Stratená. From the Pelc plateau, it is divided by Tiesňava valley. In the north, it is bounded by Duča, crossroad of paths B and C.

Point 7 - Dobšinská ľadová jaskyňa cave (Dobšinská Ice Cave), yellow tourist mark from the Hanisej meadow leads to the portal of the cave. The cave is one of the biggest ice caves in the Europe. The thickness of the ice reaches 26,5 m in Veľká sieň („The Great Hall"). From the world known ice caves, it is the southern-most, what makes the cave more unique. The cave is enlisted on the UNESCO World Heritage List. End of the path B.

Path C:

Points 1-4 are the same as in Path A. From point 4 pass to point 6 Hanesová and continue to the point 8.

Point 8 – Stratená, descent from the point 7 through Tiesňava is a tourist attraction and experience. It is possible to pass it following marked tourist trail leading from the Stratená village. The village was important center of metallurgy, connected to the Coburg family, from 18th century.

Point 9 – Stratenská jaskyňa (cave), at the plateau Duča (Slovak Paradise). It is connected to the cave Psie diery ("Dog Holes") and together the system is 22 027 meters long. Rozprávkový dóm (cavern, "Fairytale Dome") with it 79 017 m^3 is the biggest cavern in Slovakia. 14 bat species were identified in the cave. The cave is significant paleontological locality. The cave Psie diery is the richest paleontological site of cave bear in Slovakia, with 15 490 to 17 530 years old bones.

Fig.1 Orto-photo map of the study area with marked points defining individual trails of mining tourism (source http://mapy.hiking.sk, modified)

Fig. 2 Interior of Museum of M. Neubauer – starting point for every path of proposed project

Fig. 3 Remeny adit (300 m)

Fig.4 Bell tower at Lányi Iron-Mill

Fig.6 Dedinky and Palcmanská Maša dam

Legal aspects

Tourist agency, as a legal subject, will be established. The agency will specify project objectives and aims, will submit the project to respective authorities and will manage the project.

Economic evaluation of the project

The project will be proposed with minimal investment requirements. The most expensive is to obtain transport vehicles and garages. Part of vehicles, SUV cars and horse –drawn carriages, will be contracted.

Organizational conditions of the project

All the services will be offered by full-time and part-time employees of the Tourist Agency. Some services will be realized by external organizations, contracted by the Tourist Agency. Contractor of the visitor will always be the Tourist Agency. Agency will ensure operation and maintenance of own and leased vehicles.

Transport and services

Transport will be realized according to the character of road and terrain profile via:

- SUV cars with capacity of 12 people, including the driver and guide;
- horse-drawn carriages with a capacity of 12 people, including the coachee and guide;

- organized hiking in groups of 20 people with a guide.

  Other services: possible relax and refreshment at point 3 (Lányi Iron-Mill), possibility to build shelters, kiosks, rest places. At location Dedinky, it is possible to use existing tourist infrastructure and offer of accommodation, boarding, etc., as well as at Point 7.

Social aspects of the project

The project will generate new job positions, including car drivers, guides, environmental conservationists, coachees, museum employees, Tourist agency managers. Maintenance man and an employee taking care of the safety should be employed to maintenance the 300 m long mine Remeny.

Gradually, the region will transform from the "God-forgotten area" to attractive zone with different kinds of offer, where craftsmen and folk artists, together with entrepreneurs, will be able to successfully realize

Environmental protection and sustainable development

Results from the conception of the project.

Protection and safety of visitors

The most challenging place, in terms of safety of visitors, is at the Point 2 – pass through the Remeny adit. Before entering it, visitors must receive training on the movement and behavior in underground mine and sign that they understand possible risks related to the mine visit.

Concluding remarks

Asa mentioned by Drebenstedt et al. (2011), there are several reasons why people visit places of historical mining areas, including:

- Interest in mining tradition
- Interest in technique / machinery
- Interest in operation of modern mining operations
- Illegal underground visitors (adventurer)
- Interest in special situations (doing normal activities underground, e.g. concert, dinner)
- Sports (climbing, motocross, mountain biking)
- Recreation (swimming, sunbath.)

- Interest in Geology / Mineralogy
- Interest in Ecology / Biology (special flora and fauna in mine and reclamation area)
- Activities at big areas (tunk driving, paintball, crossgolf)

Many regions all around world have indisputable mining tourism potential, but for example in Slovakia, country rich in mining history and having a lot of potential mining tourism relics and sites, this type of tourism is only realized in Banská Štiavnica and its surroundings, within the project of Banská Štiavnica Geopark.

Presented paper aspires to present effective realization of "mass mining tourism" in regions with spread relics of geo and mining heritage. Such defined area can be defined as "geo and mining heritage micro park". Proposed conception of mining tourism presented in this paper will generate new positions for both locals and research specialists respecting principles of sustainability.

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