Resource of Genius Loci in Tourism

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Abstract The subject of the report is substantiation of the definition “Destination” in terms of pseudo-touristic space and the use of the coordinate model, the equilibrium model of the center of mass, the method of the optimization of the objective function, and the method of relative preference to define the expected (cost-effective) geographical location of the tourist center with distinctive meanings of “heritage.”

Keywords Destination · Pseudo-touristic space · The equilibrium model of the center of mass · Coordinate’s model · The method of relative preference

The Author’s Idea

The choice of location is a strategically important task—to ensure an efficient life activity, including effectiveness of economic management. The obvious multicriteriality of the choice of a place (costs, risks, demand satisfaction, profit, environmental damage), however, is reduced to the priority of such condition, as is the speed of response. The number of investments in major projects of territories development indicates a trend of business dependence on the breadth of the territorial coverage, ensuring the timely and quick delivery of any proposal. The increase in the number of infrastructure of distributed centers exponentially reduces the response time. That means the creation of new centers is advisable; therefore, necessary to ensure the economic efficiency of this process.

The idea of the author is to offer the development of tourist destinations adulterated meanings in the territories which not necessarily have to have valuable recreational resources or are historically established routes of people and ideas

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movement, but belongs to the new intersection of these flows or, on the contrary, neglected, abandoned, littered with garbage, uninhabited, remote, and deaf towns. There is a need to choose the place and determine the number of potential centers of tourist interest and to compare and select the best option of dislocation. The solution must meet the limitations and requirements of the law of demand and supply, economic efficiency, balance of power recreational resource, infrastructure in the host destination, and potential demand.

For substantiation of economic efficiency of choice dislocation of a new tourist destination, econometrics offer the coordinate model, equilibrium model of the center of mass, the method of the optimization of the objective function, and the method of relative preferences. Calculation algorithm is simple and intuitive. The reliability of mathematical results is confirmed by the historicity of the choice of place of the genius loci, a famous ancient good spirit, linking the intellectual, spiritual, and emotional phenomena with their material environment.

Approaches to the Choice of Location

Administrative maps demonstrate fields' influence of cities on the surrounding territories. The boundaries of identified areas subject landscape heterogeneity, the beds of the rivers and the coastal lines of the seas, the historically established relations and trade routes.

Ideal distribution of fields of influence (Voronoi diagrams, 1850) to bind to geographically dispersed customers to service centers can be achieved, if the road network does not play a large value, such as mobile cellular operators. In the case of a dense road network, its heterogeneity can be neglected, constituting private algorithms Voronoi diagrams. The actual distribution of the field of influence of cities depends on the resistance of the environmental movement of flows (material, informational, financial, flows of people, services, knowledge).

The idea of the field of influence found an interesting continuation with respect to the problem of search of the optimal position of the objects in the supply chain. According to the physical analogy, each of the cities is the center of attraction and has a certain weight (consumer potential). In the models of commercial attraction based on the gravitational analogy, the tasks use zoning consumers and their subsequent fixing of the trading point.

Model Reilly (1929) used two points of attraction for the problem of zoning the market. The Reilly's model laid the assumption that the demand for goods and services is directly proportional to the number of population in the city and is inversely proportional to the square of the distance from the consumer to the city.

In the Christaller model (1933), the role of the city is interpreted as a place of centralized supply of goods and services of the surrounding countryside (villages and other towns). The scale of the city—the center of effectively organized trade, according to Christaller is determined by four factors: (1) the level of economic development, (2) the number of working-age population, (3) the economic distance, determined by transport availability and cost, and (4) the frequency of shopping, determined by the importance and closeness.

The Huff model (Huff retail, 1963) defines the search of the perfect position through many pre-set locations, taking into account the costs in time and money of the consumer on the road to trading points, proportional to the distance and speed of the delivery. To solve this optimization problem, two methods of calculating distances are used: (1) along the shortest path between two points on the plane (Euclidean distance); and (2) the streets of the city with rectangular quarters (Manhattan distance).

An alternative gravity model is the approach, in which the optimal location for center of gravity corresponds to the point that minimizes the value of multiplication of the mass of the transported cargoes on distance of transportation (task Weber, 1903). Based on this approach, the Chopra' model (Chopra, 2000) as a criterion for decision, uses the criterion of minimizing the total costs in the supply chain. Chopra distributed total costs by categories: vehicles, real estate, stocks, and personnel.

The method of balance of costs (1) correlated with the method of balance of moments (2).

$$L_1 \cdot C_L + \frac{L_1 \cdot C_t}{v_1} = L_2 \cdot C_L + \frac{L_2 \cdot C_t}{v_2} \quad (1)$$

Table 1 The designations that identify criteria of efficiency of a tourist's destination dislocation

The name of the criterion	Designation, identifier of Z
Number of planned arrivals	p (pers.)
The population of the regions suppliers	N (thous. pers.)
Attractiveness (expert preference)	U (score)
The distance to the point of destination	L (km)
Loading thoroughfares//transport support	$G = pL$ (pers. km)
The duration of the journey//speed of transportation	$t = L/v$ (h)
The costs of the tourist transport services	$S = C_L\, L + C_t\, L/v$ (rub.)
The costs of transportation	$S_1 = C_L\, L$ (rub.)
The costs of the work of transport vehicles	$S_2 = C_g\, G$ (rub.)
The costs associated with time in the way	$S_3 = C_t\, t$ (rub.)
The income for one person of the population in the location of suppliers or specific solvent demand	q (rub./pers.)
Turnover of goods in the places of dislocation of tourist destinations	$Q = q\, N_i$, (rub.)
The capacity of the tourism infrastructure of the settlement	A (number of beds in the collective accommodation)
The throughput of the railway stations and ports (passenger traffic)	R (people per hour)

Where C_L unit transport costs—tariff for transportation (rub./km), C_g specific costs for operation and maintenance of vehicles (rub./h); C_t unit value of time in transit (rub./h)

$$\frac{N_1 \cdot q_1}{S_1^2} = \frac{N_2 \cdot q_2}{S_2^2} \tag{2}$$

Thus, using economic metrics (Table 1) in the gravitational analogy, it is possible to make up the equations of the balance at the point of “indifference” and calculate an equilibrium coefficient, which characterizes the business situation, to model scenarios of optimizing space (Zaitsev 2011).

The methods mentioned above can visualize an approach, oriented on a system of restrictions, which is exclusively economic in nature. In reality, there is objective landscape, social, environmental, and other restrictions that reduce the number of iterations—for n possible points determined, there are 2^{n-1} geographic configurations (Malyarenko 2010).

Approaches to the Definition of Tourist Space—Destination

Tourist space is considered as a part of the geographical environment in the aggregate of natural and anthropogenic elements and their interconnections, which formed the real solvent demand and a system offering a variety of services for tourist consumption.

Structuring of the tourist area includes a selection of not only individual tourist-recreational areas, but also of individual subjects of the tourist market as centers of demand. The territorial-spatial division is carried out not on the basis of geographical zoning, but on the basis of a concentration and specialization of tourist services (Dergachoff 2003).

The territorial-spatial boundaries are formed under the influence of the economic laws of supply and demand, as a result of the number of partial geographic overlay markets of recreational territories, the coincidence of the centers of donor investments, regions of the labor-supplying. The cores of such geoeconomic systems become a destination (Fig. 1).

Tourist-recreation centers and destinations are (1) the places of residence of the population, which is engaged in various sectors of the economy and (2) economic

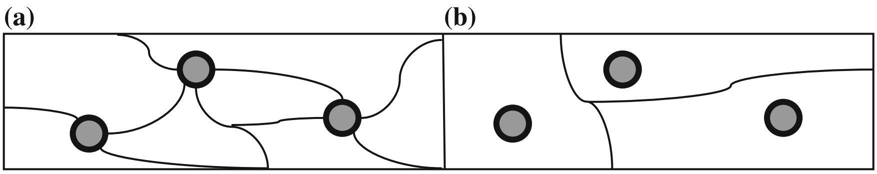

Fig. 1 **a** The administrative approach—the core of the geoeconomics system is a recreational area, forming around the tourist-recreational system. **b** The approach on the basis of scientific criteria of recreational geography and economic mechanisms of the formation of supply and demand—the core of the geoeconomics system is the destination

centers or regions, around spaces that depend on them economically and administratively.

Their spatial system that was formed historically, on the map is displayed as the network of industry centers, corresponding transport communications. The subordinated spaces represent economic areas as a result of the zoning allocated recreational zones, which form the tourist-recreational system around economic centers. The recipient regions and their cores turn into tourist destinations.

The axiological nature of constant "destination" is disclosed in the heritage (Zorin 2000). Exactly, the heritage is a semantic side of tourism. Meanings are formed in space and time, i.e., they possess the properties of historicity and location: the future, the present, and the past through the stratums of the ability of a person to the perception of the environment—consciousness, knowledge, memory, opinions, wishes, hopes. Subjectivity of perception determines the scope and content of space: the pseudo-illusory; quasi-imaginary; personal-comfortable, secluded; virtual–unreal reality. Man's perception gives the destination false ideas —inventions. Fiction becomes subject to demand, substituting the traditional meanings of natural-climatic and cultural and historical heritages. The heritage of the fictional space focuses the attention of the traveler to: (1) landscape (the appearance of the country, the object—the memorial of nature, man-made monument) and (2) the game (simulation of processes with replacement of elements on the axis of time); (3) the theme (functional objectivity).

The active development of thematic tourism, which specializes in the materialization of adulterated meanings and the events, is the tendency of the last years.

Not a historical city or natural and geographical attractions determine the spatial selectivity of the tourist flows, although they are often used as territorial anchors, and the newly created objects, to meet the demands of the modern consumer—planetariums, water parks, Lego City, the country of Santa Claus, shopping and entertainment venues become the centers of tourism demand—destinations.

Good Relations with Genius Loci

Planning and design of new destinations is carried out on the basis of an assessment of a complex of factors: the tourist potential of the region, the level of competition in it, the investment climate, administrative support, socio-demographic characteristics, etc.

Initiation of destination with the adulterated meanings imply, above other things, the selection of the best locations from the point of view of tourists and the investors' and minor advantageous positions in the real geographical space.

Good relations with the genius loci—the genius of the place are a combination of common sense, observation, intuition, and mathematical standard perception of space. That is why, when choosing the location of the thematic (false sense) destinations, the greatest attention is paid to the issues of transport accessibility, including price, and distance from regional centers—potential donors of tourist flow.

The lower the total costs, the higher the economic result of tourist business. And therefore, the option of choice will be effective.

In practice, the design of tourist destinations is dominated by decisions and tasks from the marketing point of view (surveys, financial-economic and comparative analyses). The verbal and heuristic character of the models is in a high degree subjective and focused on statistical reports—information of the past periods. Application of simulation of coordinate models, based on GIS technologies, allows substantiating the multicriteria, the different measures (Table 1) selecting the location of the point of destination on the map and providing a greater objectivity of the project solution.

Modern econometrics offers several ways for a solution of such tasks: (1) coordinate model—positioning; (2) the model of choice for the costs; and (3) multi-criteria model, taking into account factors of preference.

The diversity of conditions of economic activities in tourism and objectives of the niche optimization allow us to use the entire arsenal of modern science to substantiate and make the best possible decisions.

For example, a coordinate model can be used to define not only the optimal location of the object of tourism demand, but also a number of attractive facilities and their capacity. The model of choice for the costs is applicable to the problems of alternatives evaluating. In conditions of uncertainty and the multifactor nature of its decision-making, it is simple enough and effective, to use the method of relative preferences.

An Example of Task Solving Selection

The task: substantiate the location of Kamyshin city, Volgograd region as optimal for organization of tourist destination on the territory of the Russian Federation, including Saratov, Voronezh, Volgograd, and Astrakhan region. Prospective concepts of destination are: (1) environmental, ecological space; (2) adulterated meanings; (3) recreation; and (4) yacht tourism.

The solution of the problem involves three stages. The first stage includes analysis of the tourism potential of the selected region and the city of Kamyshin, the methods used are positioning on the plane, center of mass, and optimization effectiveness.

As a result of zoning of the territory and identification of the settlements with the assessment of the number (**N**) and the solvency of the population (**q**) in each of **n** possible points. Terms of selection of settlements are: (1) the presence of the route, (2) the journey time is not more than 8 h, (3) the population over 100,000 people. The population in Kamyshin city is 128,000 people. The share of income of the population by 2012 amounted to 18,000 rubles.

Location of the settlements on the plane is determined by the method of combining maps with grid coordinates.

The coordinates of the settlements (X_i, Y_i), the income and population (q_i, N_i), respectively, are the source data for compiling the balance equation by the method of the center of mass, the economic meaning to determine the equilibrium of the system of costs of tourists from different cities, which are the suppliers of solvent demand for tourist products of Kamyshin city.

From the balance equations of optimal coordinates of the destination can be calculated by the formulas (3).

$$X_D = \frac{\sum_i^n Z_i \cdot X_i}{\sum_i^n Z_i}, Y_D = \frac{\sum_i^n Z_i \cdot Y_i}{\sum_i^n Z_i} \tag{3}$$

where Z_i is a criterion of efficiency of the decisions, connected with the distance from the destination to the ith settlement (L_i), time in a way (t_i) and costs to travel (S_i). The demand for tourism services is directly proportional to the population size and its solvency and it is inversely proportional to the square of the distance that tourists need to overcome and the costs associated with transportation and time in the way of (4).

$$Z_i = \frac{\sum N_i \cdot q_i}{L_i^2 \cdot S_i} \tag{4}$$

where N_i—is the number of the population of the city—the supplier of tourist flow;

q_i—average per capita income of the city supplier of tourist flow;

$L_i = \sqrt{(X_D - X_i)^2 + (Y_D - Y_i)^2}$—it is the distance from the destination to the ith of the settlement;

$S_i = C_{\text{tariff}} \cdot L_i + t_{\text{inway}} \cdot C_{\text{tourist}}$—tourist cost related to the payment of the transport services and costs in a way.

According to calculations, the optimal location of the tourist destination has the following coordinates on the X-axis = 103.07; on the axis Y = 203.05. The coordinates of the city of Kamyshin in the diagram correspond to the values on the X-axis = 120; on the axis Y = 165. Deviations in the values of coordinates determine the area equal to 22 km and the travel time of 40 min. The nearest settlement, corresponding to the calculated coordinates,—Petrov Val, the population of 12,000 people, the average per capita income is 15,000 rubles a month, that does not satisfy the system limitation of decision-making.

The introduced restrictions system requires the balance of potential consumer demand and capacity of the local infrastructure for tourists' reception. Calculating result of the potential tourism demand in 11 cities of the selected regions of the Russian Federation outlined the probable number of arrivals to 1,410,732 people a year, which will draw 23,927,140 rubles into the economy of the city. Analysis of recreational resources and infrastructure potential of the city of Kamyshin showed compliance to demand for tourist services. According to the economic meaning of the balance equations of moments, the location of Kamyshin is best for the development of tourist destination, receiving tourist's flow from the territories of Voronezh, Saratov, Volgograd, and Astrakhan regions.

The second stage considers alternative solutions dislocation of a tourist destination in the indicated region: the placement of not one, but **m** tourist destinations, formation of optimal distribution of the demand for tourist products or designing tourist routes with the transit destinations (2 or more intermediate center of tourist interest). The task was solved in the framework of the coordinate model of objects disposition and optimization of the objective function—minimization of expenditures of a tourist (5).

$$S_{\Sigma} = S_1 + S_2 + S_3 \rightarrow \min \tag{5}$$

The tourist' costs represent the sum of costs: S_1—to travel from the town to the transit destination (6), S_2—the travel from the transit destination to the target one (7) and S_3—to stay in transit destination (8).

$$S_1 = \sum_{1}^{n} L_{ij} \cdot C_{\text{tariff}(i)} + C_{\text{touristcostinway}} \cdot t_{ij} \tag{6}$$

$$S_2 = \sum_{1}^{m} L_{DjDj+1} \cdot C_{\text{tariff}(Dj)} + C_{\text{touristcostinway}} \cdot t_{DjDj+1} \tag{7}$$

$$S_3 = \sum\nolimits_{1}^{n} C_{tourist\ cost\ per\ day(j)} \cdot Д \tag{8}$$

where *Д* - the number of days of stay.

The second stage determines the number, capacity and location of centers of tourist demand. Coordinate tags correlate with the location of the cities Saratov, Kamyshin and Volgograd, which can be considered as objects of tourist demand in the real-time mode, i.e., they already possess attractors and infrastructure.

Resulting from the analysis and calculation of the objective function information on the geoeconomic condition of the territory can be used for its development. For example, design of the infrastructure system of service of tourists: camping, motels, gas and motor-car repair stations, mobile points of food and beverages, trade centers, fairs, etc.

Taking into account the experience of geomarketing technologies and using the values of the real coordinates of the existing cities, we can continue problem solution of the demand's distribution and the routes' design.

At the third stage, applying the method of relative preferences, choose a specific place for the organization of a new tourist destination: from **m** possible variants of the decision on the basis of **n** factors influencing the choice (Tables 2, 3).

Comparing pairs of variants of decisions on each of the factors and recording these comparisons in the form of preference relations we obtain **n** matrices (B_1, B_2, B_3) of order **m** (number of factors) and **n** weight vectors $G_k = \{g_{ki}\}$ that forms the aggregate weight matrix of solutions $U = (G_1, G_2, G_3)$ (Table 4).

The final solution of the problem of choice is a vector of weight options ***V***, defined as the product of matrices (9)

Table 2 Analysis of factors influencing on the choice of location

Factors	Designation	Dimension	Inverse value	Significance
The cost	X_1	Thous. rubles	$1/X_1$	5
State and prospects	X_2	Score	X_2	7
The tourist resource	X_3	Score	X_3	8

Table 3 Initial data for calculation by the method of relative preferences

Option selection	X_1	X_2	X_3
Jirnovsk	6078.35	2	2
Kamyshin	5820.15	3	3
Nikolaevsk	6938.1	1	3

Table 4 Aggregation matrix, the final decision

United matrix U scales options factors B_1–B_3					
Weight, g_1	Weight, g_2	Weight, g_3	Weight, g_0	City	Solution
Options	Options	Options	Factors		$V = U \times g_0$
0.34	0.33	0.25	0.25	Jirnovsk	0.30
0.36	0.5	0.38	0.35	Kamyshin	0.42
0.3	0.17	0.38	0.4	Nikolaevsk	0.29

$$V = U \times G \tag{9}$$

The greatest value of $R = \max(v_1, v_2, v_3)$ corresponds to the best variant of the decision (in the sense of preferences under uncertainty). In this example, the maximum value of preferences corresponds with Kamyshin city.

Conclusion

The genius loci = Intuition + Observation + Mathematical Standard perception of space + Common sense

Intuition: 1569 year—an attempt to combine the Volga river with the Don of the Turkish Sultan Selim; 1697 connection of 5 seas according to the plan of Peter the great; 1942—the construction of the Volga belt road to supply the troops that participated in the battle of Stalingrad.

Observation: the analysis of the landscape in Kamyshin town, as an object of heritage and recreational resource, revealed a significant number of paleobotanical, geomorphologic, geological monuments. Among them are mountain Ears, Stolbiches, Karavaies (loaves)—huge round (in diameter they reach 4–6 m) boulders, ravines and beams—beds of ancient rivers. The unique lake Elton, spring river

Ilovlya, Medveditsa, Kamyshinka, freshwater keys are unique balneological resource destination (Baranov 1952). Recreational potential of the river Volga is not restricted to water rides, a pronounced continental climate provides an always hot, dry summer, which contributes to the development of beach rest and medical tourism with the readings of the lung, skin, neurological pathologies.

Mathematical standard perception of space: the coordinates of the optimal location correspond to the locality Petrov Val (22 km North of Kamyshin); the number of tourist arrivals may be 1,410,732 people a year, that will draw 23,927,140 rubles into the economy of the city; the adequacy of resource destination Kamyshin introduced a system of restrictions (the aggregate room Fund with deficit and the total passenger traffic of all transport dominants with excess); the dislocation of Saratov and Volgograd complementarily in relation to the destination Kamyshin; the largest weighting factor (0, 42), which characterizes the multivariate analysis the different measures values, determines the maximum value of preferences to Kamyshin city.

Common sense. It is obvious that location of a tourist destination between the cities of Kamyshin and Petrov Val meets the requirements of the comprehensive efficiency: corresponds to the balance of costs, has sufficient human resources, has recreational and semantic potential, characterized by transport availability, and the potential for development of new transport communications—the possibility of building a new river passenger port and yacht port.

The contribution of the author: (1) developed the idea of the target application of GIS technologies in tourism and (2) proposed a model of use.

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