The Tourism Service Consumption Model for the Sustainability of the Special Protection Areas

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Abstract

Latvia can be described as a tourist-friendly country. The assumption is based on the statistical data of the ever increasing share of tourism services as a part of the GDP. The tendency of growth of the tourism sector comes with downsides which include an increasing pressure on the territories of special protection area status. The goal of the research is to create a tourism service consumption model that can be used as a tool for sustainable management of the special protection areas (SPAs) while reaching the present and future needs in an efficient way. The model was created with the system modeling software STELLA and based on the acknowledged data of the Slitere National Park tourism resources, the monitoring data from the period of 2009 till 2011, and on the local and international experience and methods for determining the capacity of national parks. When comparing acquired data from software STELLA and Excel, tourism service consumption model validity was ascertained with a result of 0.98 and the credibility – 0.97. The input data is changeable; the platform is lucid and widely usable also in future.

1. Introduction

The contribution of the tourism service in the national economy of Latvia is essential; the proportion in the total value added starting from year 2004 to 2012 was at an average of 3.3%¹. During the period of crisis and in the following period citizens of Latvia most often chose local trips. The poll of citizens “DNB barometer” indicates that

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the priority option still is travelling within Latvia\(^2\). Positive tendencies in tourism industry mean that this occurrence is also applicable towards territories with a highly unprotected environment, which can be incorporated in special protection areas (SPAs). Responsible management of SPAs means that the area is managed sustainably, that is the consumption of resources happens in a way that minimizes the harm inflicted to the environment, in a socially fair and economically beneficial method, thereby accomplishing current usage needs, as well as retaining the possibility for its usage in the next generations\(^3\).

The principles of sustainability in the development of tourism, which are subjects to environmental, economic and socially cultural aspects, should be created in a balance between these three dimensions. Also the United Nations Organizations (UNO) the Environment program (UNEP) and the World Tourism organization (UNWTO) indicate towards it. Uncontrolled growth of tourists flow can lead to a rapid usage of tourism destination which in a short time can be damaged and become unattractive\(^4\). On the basis of existing conclusions of sustainable tourism, restrictions to the tourism growth should be identified. According to traditions, sustainable tourism growth restrictions are established fortifying to the carrying capacity of environment – to a limited amount of visitors in a specific space and period of time, which has not caused any serious danger to the environment\(^5\). UNO defines environment border as an objective, measurable, acceptable in the tourism development stage\(^6\). In order to achieve a further development, tourism participants have to deal with environment: by not essentially changing the resource or its integrity, which in its turn changes the environment carrying capacity. Since tourism is a dynamic phenomenon, problems resolve from how to determine a static tourism objects visitation limit\(^7\).

Visitor counting method capacity in outcome indicators includes different counting methods and tools, like surveillance, visitor registration, conclusive counting and automated counters. SPAs visitor counting method capacities indicate visitor indicators are recorded according to the visitor amount, date and time, movement flow, route, volume of the group, dimensional division, visitor feedbacks and overall behavior\(^8\).

Limits of SPAs help to determine quality standards, which describe an acceptable adjustment sum, give opportunities to cover planning and by doing so allow finding alternative for management events in order so the standards would not be infringed. Visit limits are indicative for each SPAs, depending on different factors, for instance, tourism area life cycle, and the determination of these limits are resources demanding events\(^9\). The World Tourism organizations already in 1981 advised guidelines for environment carrying capacity (limit) implementation\(^10\); for example, the limit for a country park is 15 – 70 people per hectare, for a forest park – 15 people per hectare\(^11\). In specific parks, as in South Korean Chi-Ri National park – 10 people per hectare\(^12\), for the national park of northern -Iran TELAR – 5.6 – 5.8 people per hectare\(^13\), but there are no established environmental capacity limits and measures for determining them in national parks of Latvia. One of these measures in SPAs is connected with the monitoring of tourism service, which serves as the constructive support for the provision of sustainability and at the same time as a basis for determining tourism service profits.

There are no institutions in Latvia which are collecting and summarizing visitor statistics data for SPAs in general. Data about specific objects or lodgings is available, but this data is fragmental, incomplete, and no data is available about the long-term tendencies or the different internal/external factor influence to the tourism service consumption. In a situation when the tourism service profit of a SPA needs to be estimated and no limits have been set possibly the value transfer method (VTM) can be used. VTM is an “transfer of the evaluation of the change of environment system to a new situation which differs from the situation, where the values where first obtained”\(^14\) – \(^15\).

The processing of the flows of tourists and thus the data of tourism service profit is a financial and time-consuming process, which is recommended to be, facilitated through creation of a model, by using different tools, for example, POWERSIM, SIMULINK, STELLA, etc. The software STELLA has been recognized as a recommendable, more user-available (for example, in a demo version), functionally more acceptable and easier to acquire for ecological and economical systems\(^16\). Foreign researchers have used the STELLA model, for example, in the planning of tourism\(^17\), and in the destination management, National park ecological relationship and economical value connection research\(^18\), in the decision process of vacation and tourism development\(^19\).

In the research area of Latvia only two models have been established: park public value and use model with POWERSIM\(^20\) and tourism service economic benefit determination model with STELLA\(^21\).After synthesizing complexities of SPAs sustainability tool usage in the tourism effectiveness provision and thus in the profit incensement, the authors discovered their insufficiency both abroad and in Latvia, particularly in the field of tourism service consumption.
2. Framework of Research

The aim of research is the development of tourism service consumption model for sustainability of areas of special protection of Latvia. In order to reach the goal, following tasks are formulated: to develop SPAs tourism service consumption model; to carry out validation of SPAs tourism service consumption model; to summarize theoretical position, modelling results and to formulate conclusions. Methodological foundation of the research is a study of SPAs sustainable tourism, study of current models related to tourism by international and Latvian scientists. For the validation of model tourism service monitoring data from year 2009 to 2011 made by Latvian Rural Tourism Association (LRTA) „Rural traveller,” has been used. The novelty of the research: for the first time the research presents tourism service consumption determination methodology; a tourism service consumption model has been developed; tourism service consumption model validation has been carried out. Significance for national economy: the developed tourism service consumption model can economize financial and human resources; can promote comprehension of the tourism service economic significance; can help in the creation of tourism politics.

3. Description of tourism consumption model:

The SPAs tourism service consumption model (see Fig. 1) consists of 3 blocks: Calculation block of capacity; Annually initiated visitor amount block; SPAs visitor created consumption block.

3.1. The tourism service capacity calculation block

The tourism service capacity calculation block consists of 3 active elements: for SPAs resources and capacities – SPAs ability to receive number of people to one unit of area, maximal SPAs capacity possibility to welcome visitors and SPAs resource completion indicator (see Fig. 1).

The maximal nature park capacity possibility to welcome visitors is calculated with a formula:

\[ \text{capacity}_2 = \text{capacity}_1 \times R \quad (1) \]

where capacity _2 – SPAs maximal capacity possibility to receive visitors (people amount – people) SPAs capacity_1 – SPAs possibility to welcome people amount to one unit of area (people); R – SPAs resources (area – ha).

The dynamic model of STELLA gives an opportunity to calculate SPAs resource implementation (Resource filling) (%) with a formula:

\[ RA = \frac{AP}{\text{capacity}_2} \quad (2) \]

where RA is SPAs resource filling; AP – SPAs visitor amount in actual simulation time; capacity_2 – SPAs maximal capacity possibility to welcome visitors. The dynamic system model of STELLA allows calculating RA, accordingly with a help of color indicator signalizing about a situation when the indicator of this capacity is being exceeded.
3.2. **SPAs annual serviced visitor amount calculation flow**

SPAs annual serviced visitor amount calculation flow is a combination of 3 active elements (see Fig. 1), which allow determining the SPAs visitor amount (AP) simulations in real time:

- Annual increase, which with the help of element Growth fraction (visitor amount growth tendencies depending form the simulation year, percent within year) allows to simulate SPAs visitor amount changes in a specific period of year in relation to the indicator of previous year, by a formula:

\[
GF = \frac{AP}{Ap_i},
\]

where GF is visitor amount growth tendencies depending from simulation year, percent within year; AP – SPAs visitor amount in a real simulation time; Api – SPAs visitor amount in the previous year.

It is possible to dial Annual element growth through STELLA software Interface with a help of a visual dynamic data table. For example, the annual growth is chosen as 10% per year;

- Growth of visitors (development of people amount growth), the element allows to determine annual visitor amount growth tendency in absolute numbers for a specific year. The element is connected in a flow with data element-container Visitors in total, thus in each simulation year cycle data renewal is performed;
- Visitors in total (visitor total amount in a specific year, people) simulation element shows visitor amount in a specific year based on the input data of annual visitor amount growth.

3.3. **Tourism service consumption calculation part**

Simulation model SPAs (visitor) created tourism service consumption calculation part (see Fig. 1), allows to calculate visitor consumption of the park. The system model flow consists of four active elements:
Consumption division distribution in groups (Consumption Distribution groups) (unit of measurement—percentage coefficient remarked into decimal fraction) data massif with time dimensions (Day1, Day2, Day3, Day4, Day5, Day6, Day7) and consumption dimensions, which can be input with the help of data introduction table from STELLA software Interface with a visual dynamic data input table help (Fig.1). A color indicator has been added to the data input table, which, in combination with element ARRAY SUM (Consumption Distribution groups), signalizes about a discrepancy in the input data massif, disparity with the sum 1 (100% stated in decimal fraction);

- Consumption in Groups (Consumption Groups) (unit – Ls) the element – data massif, which includes information of each SNP visitor category implemented average expenses;
- Yearly Expenditure (Ls), data massif, which is stated by a formula:

\[
\text{Yearly Expenditure} = \text{Consumption Distribution groups} \times \text{Time, consumption} \times \text{Visitors Total}
\]  

4. Final element of system Dynamics model Absolute Expenditure allows calculating SPAs visitor created absolute general tourism service consumption for a specific year.

4. Description of the Slitere National park on the background of the tourism service consumption research

The Slitere National park is located in the Northwest territory of the republic of Latvia – in Northen-Kurzeme, region of Dundaga, in the municipality of Dundaga and Kolka. The western, northern and eastern border of the Slitere National park is the Baltics sea and the gulf of Riga, on south-northern – Kursa highland and the acclivity of Dundaga. The total area of the Slitere National park is 26499 hectare. Three main activity possibilities can be pointed out as the leading ones in the Slitere National park:

- Recreation and tourism by the sea using guest house services in the seacoast villages;
- Nature investigation tourism – existing and planned tourism routes represent the protected values of the Slitere National park;
- Cultural heritage investigation tourism –the Livonian cultural heritage.

The most sensitive territories against anthropogenic load in the Slitere National park are located in the gulf of Riga – sand hills and beaches, Blue mountain Slitere scarp and rock outcrops, swamp of Bazi and Peters lake lowland.

5. The validation of tourism service consumption model: example of the Slitere National park

Tourism service consumption model (see Fig.1) was used as the validation basis of the tourism service monitoring data of the Slitere National park (SNP). The main aim of the monitoring made by the SNP was to plan and forecast more justifiably and effectively little and medium entrepreneurship in a specific area, as well as in the region overall, by leaning on sustainability of environment. If the amount of SNP visitors and the main flow directions of them is not known, it is very hard to tell the impact of tourism on the values of environment and the economic development of listed territory from the tourism service consumption.

The tourism consumption model (see Fig. 1) developed by the authors was approbated by using SNP monitoring data, which usage was difficult because of different recording points depending on the year, lack of uniformity of monitored object data, the choice of unsuccessful visitor residence duration time step, which is essential in the visitor and tourist diagnostics. Authors chose to adapt visitor residence steps according to adopted scientific definitions in tourism. Taking as the basis the recommendations of World Tourism organization environment carrying capacity (limits) guideline implementation, world scientists suggestions and practitioner experience with SPAs, including national parks, in the model calculations of SNP the authors used 8 people per hectare.
The dynamic simulation with software STELLA was made according to the Model block components: SNP capacity, the calculation of annually welcomed visitor amount and visitor (including tourist) created consumption. The final element of system dynamics model Absolute Expenditure allowed to calculate SNP visitor created absolute total tourism service consumption for a specific year, by leaning on tourism service monitoring data from year 2009 to 2011 and adopting that their annual increase is 10%.

After dynamically simulating with software STELLA SNP tourism service consumption according to conditions described previously, it was clarified that by making a simulation (with originally acquired data of period 2009 to 2011) a graphic was acquired for the period of 2014 to 2040.

The curve of graph showed Tourism service expenditure (Absolute Expenditure) increase with a 10% annual increase. The null cycle point – year 2014 (with acquired SNP tourism service consumption monitoring data from period 2009 – 2011) at 49280 SNP visitors Model has shown 705201 Ls tourism service consumption.

Validation operations and their sequence are specified in the validation process scheme (see Fig. 2). 8 experts were involved in the validation process, who evaluated 5 criteria with a 5 point Likert type scale. The evaluation result gave a numerical value – tourism service consumption model (STELLA) and tourism service consumption (EXCEL) evaluation. After comparing STELLA model acquired SNP tourism service consumption the authors ascertain that the result corresponds to the planned demands and is very close, that is – it is valid. Furthermore the model shows SPAs limit, what is a very important advantage for determining tourism service consumption for the sustainability of special protection areas in Latvia. Taking into account the complicated situation of SNP monitoring, when it is hard to separate citizen and tourist activities and the “hot spot” concentrated tourism flow, from the rest of the national park territory.

6. Conclusions

In order to provide SPAs sustainability, new tools, for example, the author proposed Tourism service model for tourism service consumption effectiveness, tourism development and environment protection, are needed. Tourism service model is recommendable in the processing of tourism service monitoring data, in the determination of SPAs visitor limit, in the limit determination in concentration places of tourist flow. After performing SNP tourism service
model validation, at 49280 visitors in 2014, 1007380 euro tourism service consumption was ascertained, but in year 2030 the limit of the park will be reached with 4133543 euro tourism service consumption. SNP tourism service consumption verification with software STELLA and EXCEL showed a similar result, accordingly 495618 euro and 495594 euro. Tourism service consumption validity was ascertained 0.98 and the credibility 0.97.

References

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