

Guideline for use of

E-learning game-based technology for training and education of transport and logistics specialists (TRELOGIC)

1. Introduction

The Baltic region is remarkable for its economically advantageous geographical position within the Eurasian transport system. Reconfiguring supply chains around customers has led to the necessity for more flexible and adaptive formation system of transport and logistics links with assistance of decision support system.

There are seven typical steps of multi-criteria decision making for transportation process:

- to identify transportation alternatives;
- to establish performance criteria;
- to establish relative importance of performance criteria;
- to establish commensurate scale for measuring levels of each criteria;
- using the established scale, quantify level (impact) of each criterion for each alternative action;
- to establish the combined impact of the different criteria for each alternative;
- to determine the most satisfying alternative.

2. Methodological approach

The methodological approach used of the game-based training method TRELOGIC involves a 4-step learning process for case study:

- A. The formulation of a practical problem, to find the source of data for its solution. Formulation of alternative routes for the delivery of goods within the frame of case study. Search of the necessary data.
- B. Formulation of criteria for choosing the best route. Study opportunities of the Logistics Performance Index (LPI) as an interactive benchmarking tool created to help professionals in logistics identify the challenges and opportunities they face in their performance on trade logistics.
- C. Study The Analytic Hierarchy Process (AHP) as method for multicriteria decision making.
- D. The practical use of the AHP method to solve the problem formulated in the case study on the base of developed software tool. Individual and group expert application of software.

3. Description of learning process

3.1. Game based case study. The formulation of a practical problem, to find the source of data for its solution

A container block train from China should arrive in Sweden (Container Terminal of the Stockholm port). Terminal-logistic centre of the Moscow region is the transit point of the route. Then there

are three alternatives to achieve Stockholm through Riga (Latvia), Muuga (Estonia) or Rauma (Finland):

- Moscow - port Rauma (Finland) - Stockholm
- Moscow - port Muuga (Estonia) - Stockholm
- Moscow - port Riga (Latvia) – Stockholm



Fig.1. Three alternative routes

The following information and assumptions are used:

- all tariffs for transportation by one mode of transport for all routes are the same,
- all service charges in all ports are the same,
- the distances between the departure point, intermediate points and the delivery point are determined using Google Map.
- Information about the LPI for countries through which alternative routes run is presented on the website of World Bank (<https://lpi.worldbank.org/about>) .

3.2. Formulation of criteria for choosing the best route

Taxonomy of key performance indicators (KPI) for this model can be described by set of parameters in five clusters – Economics, Geography, Infrastructure, Technology and Ulterior factors. Metrics for both quantitative and qualitative KPIs are proposed in [4] and described in additional instruction. Additionally, students can use Logistics Performance Index (LPI) as KPI. Students should analyse KPI in order to evaluate which of the factors for the case under consideration will be more influence in pairwise comparison.

3.3. Study the Analytic Hierarchy Process (AHP) as method for Multi-criteria decision making

The analytic hierarchy process (AHP) is a structured technique for organizing and analysing complex decisions, based on mathematics and psychology. It represents the most accurate approach for quantifying the weights of criteria. Individual experts' experiences are utilized to estimate the relative magnitudes of factors through pair-wise comparisons. Each of the respondents has to compare the relative importance between the two items under special designed questionnaire.

AHP is a multi-criteria model that provides a methodology for comparing alternatives by structuring criteria into a hierarchy, providing for pair-wise comparisons of criteria at the lowest level of the hierarchy to be entered by the user, and synthesizing the results into a single numerical value.

Students should study the AHP method and analyse KPI in order to evaluate which of the factors for the case under consideration will be more influence in pairwise comparison [1-3].

3.4. The practical use of the TreLogic to solve the problem formulated in the case study on the base of developed software tool

There is two step procedure of the practical use of the TreLogic.

1. Individual work. Using the software Trelogic, student compare each alternative route by all criteria and give them an expert assessment in accordance with the instructions.
2. Group work (face-to-face workshop or webinar). Students discuss with other participants of the game their expert assessments and the reasons for their differences.

4. References

1. Kcb Kadri, Kardi Teknomo. Analytic Hierarchy Process (AHP) Tutorial.
https://www.academia.edu/30117750/ANALYTIC_HIERARCHY_PROCESS_AHP_TUTORIAL
2. Matteo Brunelli. Introduction to the Analytic Hierarchy Process, 2015.
<https://core.ac.uk/download/pdf/80714029.pdf>
3. Thomas L. Saaty. Transport planning with multiple criteria: The analytic hierarchy process applications and progress review. Journal of Advanced Transportation, 1995, Volume 29, Issue 1, 81-126. <https://onlinelibrary.wiley.com/doi/epdf/10.1002/atr.5670290109>
4. Igor Kabashkin, Jelena Luchina. Development of the Model of Decision Support for Alternative Choice in the Transportation Transit System. Transport and Telecommunication. 2015, Volume 16, No 1, pp. 61–72, ISSN 1407-6160, DOI: 10.1515/ttj-2015-0007.
<https://content.sciendo.com/view/journals/ttj/16/1/article-p61.xml>