Eco-friendly, safe and economically feasible energy concepts and technologies for European Inland Shipping

The Poettinger Case 2016

Teaching Note

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Content

This case study is a discussion/design case that requires students to work out their own solution on a real-life base scenario. The case examines the development of eco-friendly transport strategies, with a defined focus on the European inland waterways as an eco-friendly and efficient mode of transport. It is drawn around Poettinger Landtechnik GmbH an Upper-Austrian manufacturer of high and heavy, agricultural machines which plans to shift transport volumes from road to eco-friendly modes of transports when it comes to supplying the Ukrainian market. Therefore, real data are provided to the students, including the technical specifications of the agricultural machines as well as the related shipment data to the Ukraine, to Bulgaria and to Romania. The students are required to analyse the data and consider the information they get for creating their transport strategy. They are also required to consider the trans-European transport network TEN-T. The TEN-T is a transportation network, which consists out of nine main corridors that connect different regions of Europe. This network should function as a basis when the students develop their eco-friendly transport strategy. Basically the development of this transport strategy includes:

- the examination of the trans-European transport network TEN-T as well as its gateways to neighbouring third countries,
- the analysis of given information, such as technical data and shipment data,
- the understanding of different modes of transport and
- the conception of multimodality, which requires the understanding of the applicability of different modes of transport to carry different goods.

Furthermore students required to present the concept during a 20 minutes presentation and to give reasons for the taken decisions.

Target Group

The case is primarily recommended for graduate logistics students. A bachelor's degree in logistics- or production-management or experience in management disciplines is supposed to be supportive. The recommended group size consists out of four students.

Structure of Course Integration

The Case Study is part of a course that consists out of three individual lectures with a time lag of one month each, as shown in Figure 1. In the first lecture students should learn about the characteristics of transport modes, the European transport network TEN-T and the way different transport modes can be combined to multimodal transport solutions. The amount and the type of information provided by lecturers on these topics (e.g. presentation, key note) are depending on the lecturer. A list of links that may be used as a source can be found the last section of this document. The students are furthermore provided with the case study during the first lecture and the instructions. By the second lecture, students have to read the case study, gain specific information concerning the topic mentioned within the case and compare different modes of transports in regard of the requirements that are given in the case. They decide which mode(s) of

transport should be used, but they do not work out a certain transport strategy in detail. The students should think about a transport strategy draft that they can give reasons for and present that draft to their colleagues and the instructor during the second lecture. The transport strategy draft is discussed within the second lecture and the instructor, as well as students provide feedback. If necessary, the instructor also has the possibility to draw the attention of the students to a certain transport mode which may appear more suitable, e.g. to the inland waterway.
Between the second and the third lecture the students work out the transport strategy in details, considering what they worked out until then, the information provided in the case and the feedback provided by the instructor and other students within the second lecture. By the third lecture, students have worked out the transportation strategy and present it to their colleagues and the instructor. An expert from the industry may be asked to participate in the lecture, as far as this is desired by both the instructor and the representative of the company. The presentation of the transport strategy and the students approach should take about 20 minutes and is followed by a 5-10 minutes discussion to put the students in a position to argue and give reason for the decisions they have taken. The lecturer should ensure that all of the learning aims are being covered by the students.

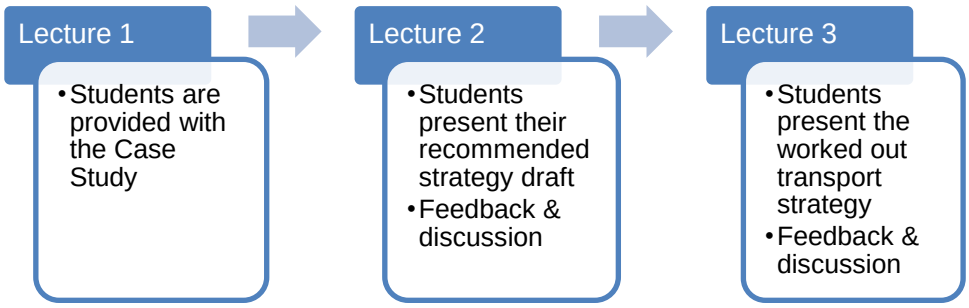

Figure 1: Design of the course.

Learning Aims

After the course students:

- have the ability to explain the basic characteristics (i.e. environmental impact, infrastructure, commodity groups & markets, timing), the advantages and the disadvantages as well as the applicability of European rail, road, inland waterway transport and multimodal transport of the concerned cargo,
- have fundamental knowledge of the European transport network TEN-T including the European transport geography and gateways to neighbouring third countries,
- have a deeper understanding of the characteristics of inland waterway transportation including the integration of inland water vessels within multimodal transportation concepts,
- are able to explain the concept of multimodality and discuss its applicability in certain transport cases,

- are able to formulate a well-organized and eco-friendly transport strategy on a real-life case basis and
- are able to present and discuss their strategy within 20 minutes in a well-structured and arguable way.

Tasks

Students have to:

- identify the advantages and disadvantages of different transport modes and compare the transport modes in regard to the transportation of high and heavy, agricultural machines, as mentioned in the case as well as consider possible ways of transportation based on the trans-European transport network TEN-T,
- by the second lecture evaluate and decide for one mode of transport or combination of modes of transport to create a transport strategy draft, which represents their thoughts and ideas,
- present the transport strategy draft during the second lecture and give reason why they have chosen a certain mode of transport or a certain combination of modes of transport,
- based on the draft and on the feedback of their instructor students develop a eco-friendly transport strategy for high and heavy agricultural machines from the production site in Austria to the Ukraine, as mentioned in the case. Therefore students need to consider economic and ecological factors and, wherever possible and/or necessary, combine different transport modes.
- make use of the data provided within the case, and
- create a well-structured presentation of 20 minutes, followed by a 10 minutes discussion, to introduce the transport strategy and argue the decisions that have been taken, e.g. why the use of a certain mode of transport is recommended.

To enhance the exchange and sharing of information, it is recommended that students document the progress of their work in an online blog, provided on the learning management system "ILIAS", or in another suitable way (e.g. Skype meetings). Thus, experts from the industry or other students working on the case study can provide feedback and information.

Analytical Framework

It is essential for students to know the European transport network TEN-T and the basic characteristics and applicability of European rail, road and inland waterway transport as well as multimodal transport forms. The same is valid for the different application spectra of each individual mode of transport as well as of multimodal transport forms. Furthermore suitable modes of transport should be applied according to prior analyzed requirements, such as product characteristics, shipment volumes or available infrastructure. The results of the analysis are used for synthetization to generate a transport strategy that fulfills specific requirements that are pre-given in the case. Finally, the student's transport strategy is presented during the lecture within a 20 minutes presentation that is followed by a 10 minutes discussion.

Due to the work in small groups of up to four, students additionally improve their interpersonal skills and train the structured approach to problem-solving, organization within a team and team-cooperation. Presentations of the results enhance their presentation skills.

Data Analysis

The students are provided with the shipment data of 12 months that include the type of machine and its weight and dimensions and the individual date of shipment as well as information regarding the packaging and the handling restrictions of each machine. Those machines can either be put onto wooden pallets or be transported unpackaged. Handling restrictions include the possibilities to move the machines by fork lift, by crane or by towing machines, which most of the time means by tractor. Moving machines by tractor is comparable to moving a trailer by truck.
The data are provided within a Microsoft Excel table (*Shipment Data_Case Study agricultural machines.xlsx*) that consists out of 420 data records. Every record represents one machine that was transported. The aim of the data analysis is that students analyse the data and gain knowledge about the flow of goods and about the specifications of individual machines. As example, if the data records are being sorted ascending by the date of shipment, it can be seen that there were seven machines transported on May 22nd. Considering the sizes of the machines it can be calculated that these machines equal three full truck loads. Based on the data for May, it can be seen that there were eleven full truck loads that delivered cargo to the Ukraine. This information can be used by the students in order to compare e.g. the economic impact of truck shipments compared to the economic impact of a multimodal transport strategy that includes inland water vessels. Additionally the data show that there is a significant seasonality, with no transports during the winter time. Students have to consider that as a positive effect, since inland waterway transports are limited due to water levels and ice in the winter time.

Evaluation

The students' performance can be evaluated by rubrics, a scoring table, which can be seen in Figure 2 and which is provided together with the case documents. The table features seven different criteria that refer to the transport strategy as well as to its presentation. These criteria need to be evaluated by the instructor and are:

- Quality of research,
- Structure of presentation,
- Organization of arguments,
- Feasibility of solution presented,
- Intra-group dynamics,
- Evidence of consideration of all case factors,
- Multiple resolutions of the same scenario issue.

To simplify and objectivize the evaluation process, scoring is done by referring to qualitative statements that apply to each criterion, which is available in a Microsoft Excel-file (*Evaluation*

Rubrics.xlsx). Every statement equals a number. The final score is obtained as the sum of the numbers.

	Insufficient	Sufficient	Good	Excellent
Quality of Research				
Structure of Presentation				
Organisation of Arguments				
Feasibility of Solution presented				
Intra-group Dynamics				
Evidence of consideration of all case factors				
Multiple resolutions of the same scenario issue				

Figure 2: Evaluation rubrics.

The individual criteria are calculated by the sum of the following values:

- Insufficient: 0
- Sufficient: 2
- Good: 4
- Excellent: 6

Each criterion is described in order to ensure objectivism during judgment. For the used criteria, descriptions are defined as stated in the following Figure 3:

	Insufficient	Sufficient	Good	Excellent
Quality of Research	Students worked out their transport strategy as an overview. There are significant errors. Information regarding sources cannot be provided.	Students worked out their transport strategy with minor errors and some details missing. Information about the used sources can be provided partly.	Students worked out their transport strategy with some details and can give information about the sources they used.	Students worked out their transport strategy highly detailed and can give detailed and specific information about the sources they used.
Structure of Presentation	The presentation does not meet with the 20 minutes timeframe, appears to be inconsistent and gives an overview about the transport strategy that has been developed. Relevant details of the transport process are missing.	The presentation does meet with the 20 minutes timeframe, appears to be partly inconsistent and gives an overview about the transport strategy that has been developed. Some details of the transport process are be missing or be worked out poorly.	Students present their strategy in a presentation that is not significantly longer or shorter than 20 minutes. The transport strategy is explained in an understandable way with an appropriate level of details.	Students present their strategy in a presentation that is not significantly longer or shorter than 20 minutes. The transport strategy is explained in an understandable way with an appropriate level of details, including the decisions that have been taken. The students have prepared back-up-slides for the following discussion.

	Insufficient	Sufficient	Good	Excellent
Organisation of Arguments	Students cannot give reason for the decisions taken. They do not know the relevant advantages and disadvantages of their proposal and can poorly argue how they developed the transport strategy.	Students can give reason for the main decisions taken and know some of the advantages and disadvantages of their proposal.	Students can give reason for the main decisions taken and know the advantages and disadvantages of their proposal. They can explain how they developed their transport strategy.	Students can give reason for every decision taken, know the specific advantages and disadvantages of their proposal and can explain in details how they developed their transport strategy.
Feasibility of Solution presented	The transport strategy is not feasible for the case study.	The transport strategy is missing some details in a way that the transport strategy is partly feasible.	The transport strategy considers the main details and is feasible for the case study.	The transport strategy is feasible for the case study and considers all relevant details, such as details regarding the interconnection of different transport modes or the appropriate loading and unloading processes.
Intra-group Dynamics	Group-work and the presentation are accompanied by intra-group discussions, disagreements and discrepancies.	The students appear as a group. Discrepancies are noticeable, the presentation appears to be slightly unprofessional.	The students appear as a team. Minor discrepancies are noticeable, e.g. during the presentation, that appear slightly unprofessional but planned.	The students appear as a homogeneous team. The presentation appears to be professional and planned.
Evidence of consideration of all case factors	Students present a transport strategy without considering economic or ecological factors as well as the requirements stated in the case (e.g. size of the machines).	Students present a transport strategy and mainly considered at least some economic or ecological factors as well as most of the requirements stated in the case (e.g. size of the machines). Within a multimodal solution the students have barely considered the main specifications of each used mode of transport.	Students present a eco-friendly transport strategy and mainly considered economic and ecological factors as well as the requirements stated in the case (e.g. size of the machines). Within a multimodal solution the students considered the main specifications of each used mode of transport.	Students present a eco-friendly transport strategy and considered economic and ecological factors as well as the requirements stated in the case (e.g. size of the machines). Within a multimodal solution the students considered the individual specifications of each used mode of transport.
Multiple resolutions of the same scenario issue	Students did not respect possible risks within their transport strategy.	Students have respected possible threats within their transport strategy.	Students have respected possible threats within their transport strategy and are able to present them.	Students have respected possible threats within their transport strategy and are able to discuss them when asked.

Figure 3: Criteria definition for the rubrics.

It is important to note that the criterion of intra-group dynamics should refer to the impression that the instructor have of the behaviour and the appearance of the group as a team. It does not reflect the way tasks were divided within several team members or to which amout individual team

members took part during the group work. To identify students who particpated at a significantly low level or not at all, a peer-evaluation-form should be handed out to the students.
The peer-evaluation-formular (*Peer Evaluation Form.pdf*) enables the students to evaluate the members of their team in regard of the individual dedication to work. For every team member, a student can assign ten points, which means in a team of five, every student has 40 points to assign. The maximum score per member is limited by 15. An average score of seven or below is considered a negative grade. Students that contributed equally are expected to assign ten points to each other. If one participated more or less within the course, more or less points should be assigned, however, a deviation from the average of ten points needs to be argued on the formular. The formular itself is handed over to the instructor of the course. Usually the scores move literally between eight an twelve points, which is considered to be normal and which is supposed to not have any consequences. If individual students get a significantly high score, this might be considered by the instructor in regard of the grades these students get. If individual students constantly get a significantly low score, this should not directly result to an effectively negative grading, but should lead to a bilateral discussion between the instructor and the affected student or – possibly in a second step if no solution can be found – between the whole group and the instructor.
The evaluation itself consists out of two parts: the grading rubrics, that includes defined criteria and aspires towards a quantitative evaluation method, and the peer-evaluation-form, that gives the students the opportunity to give feedback about the level of participation within the group to identify those who do not actively take part.

Additional Information

The additional information provided within a separate document is a required preparation for the students to get an overview on the general European traffic geography and means of transport.

TEN-T and European Traffic Geography

http://ec.europa.eu/transport/infrastructure/tentec/tentec-portal/map/maps.html
https://www.bmvit.gv.at/service/faktenblaetter/tent.pdf
http://www.inlandnavigation.eu/media/33990/Map_Europe_VIA_2014.pdf
http://www.unece.org/fileadmin/DAM/trans/doc/finaldocs/sc3/ECE-TRANS-SC3-144r1e.pdf
http://www.european-waterways.eu/e/index.php

The River Danube and Inland Waterway Transport

http://www.rewway.at
http://www.viadonau.org/
http://www.danube-logistics.info/
http://www.doris.bmvit.gv.at/en/

Trimodal Port of Enns

http://www.ennshafen.at
http://www.ennshafen.at/files/20150420-donaustar-a4-flyer-roro_012-web_(2).pdf

Transport Corridor Europe Caucasus Asia

http://www.traceca-org.org/en/routes/gis-database-maps-downloads/