



MSCs in railway transport and logistics: State of the art and perspectives for a new programme

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Abstract

The objective of this paper is to discuss results obtained from a structured survey on MScs in railway transport and logistics, which has been conducted within the RiFLE project. RiFLE stands for Rail Freight and Logistics Curriculum Development and was funded by the Erasmus (LLL) programme of the European Commission. The aim of RiFLE was to develop master courses to be delivered in English language by the participating institutions as separate but shared programmes in their universities. The approach was to analyse, enhance and adapt existing courses already offered by the participating institutions within a modern rail freight and logistics environment. Therefore, the goal of the survey was to define the state of the art of the current offer of MSc 'railway transport and logistics' related courses across the European and non-European countries. For the collection of data, a questionnaire has been developed. 'SuperSurvey' was used to approach intended respondents. SuperSurvey is a user-friendly online platform for collecting information using questionnaires. The target group included professors, lecturers and masters programmes managers in transport and logistics. Existing relevant programmes from European and other universities and institutions for higher education have been collected and analysed. Information collected helped to define a comprehensive framework of transport and logistics curricula, courses and programmes and to understand different levels of learning and structures of higher education such as single modules, bachelor courses, master courses, as well as mobility programmes and patterns.

Keywords: Rail freight and logistics, higher education, innovation, survey, state of the art.

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1. Introduction

Knowledge exchange, mobility and expertise are all drivers for a common good. Education and training for more skills are needed than ever before. Jobs related to rail industry and logistics systems require a higher level of skills and better qualifications and therefore there is a global need for innovation in the field.

In the Freight Transport Logistics Action Plan of The European Commission [COM (2007) 607 final], it is stated that ‘today, training provided by universities and other institutions varies greatly in Europe. Efforts are required to focus and enhance the qualifications of logistics personnel, notably by strengthening competence in transport, and to support lifelong learning’ (COM., 2007). The lack of consistency and uniformity of education and training in the European universities motivated us to develop this work.

The objective of the RiFLE project (RiFLE) was to develop Rail Freight and Logistics Curriculum for a complete cycle of study by using an innovative multidisciplinary approach equipped with curriculum modelling tools. The idea is that the courses developed will be delivered in English language by the participating institutions, and they will be compatible to allow the students to attend some of their modules in the other universities. The possibility of a joint programme and degree is currently under evaluation. Therefore, the approach was to enhance and adapt courses already offered by the participating institutions within a modern rail freight and logistics environment.

RiFLE project team included participants from United Kingdom, Bulgaria, Italy and Germany. The University of Newcastle upon Tyne (UNEW) represented by NewRail was the leader of the project. Sapienza Università di Roma represented by the Department of Civil, Building and Environmental (DICEA) brought its knowledge and expertise on Rail Freight Operations, Freight Terminals, Railway Freight Equipment Design. The Higher School of Transport ‘Todor Kableshkov’ in Sofia, Bulgaria, contributed to the development of modules such as Industrial Management and Logistics, Organisation and Management of Rail Freight Systems, Rail Freight Business Cases and Marshalling Yards. The University of Applied Science in Ingolstadt, Germany, utilised its expertise in computer science to develop a modelling tool for optimising curricula and will also be contributed to modules that encompass Intelligent Transport Systems and E-Tools in rail freight and logistics.

The project also promoted intensive collaboration between Academia and Industry. Therefore, apart from the core consortium, the project incorporated nine associated partners (institutions from the rail freight and logistics industry) from different EU countries in its team.

The survey on MScs in railway transport and logistics has been conducted within the work-page dedicated to develop an inventory of rail, transport and logistics curricula, courses, programmes, training facilities and institutions. The aim was to collect information that help understand different levels of learning and structures of higher education as well as mobility programmes and patterns.

2. Objectives

In the framework of the general scopes of the RiFLE project, the first goal was to define the state of the art of the current offer of MSc ‘rail transport and logistics’ related courses across European and non-European countries in order both to fix the core modules in which the new curriculum should provide and to identify possible gaps in the present MSc courses, which could be filled in by the new formative offer. The main objectives of this phase were:

- to analyse the current situation with transport and logistics-related courses and programmes offered in higher education institutions;
 - to develop a comprehensive inventory of master programmes in freight and logistics, where rail transport is a focus;
 - to collect a comprehensive list of compulsory and optional modules useful for modelling the new curriculum;
 - to identify cooperation levels between 'rail and logistics' companies and educational institutions.
- In achieving the objectives of this WP, the following steps were followed:
- questionnaire design for data collection;
 - identification of similar projects as RiFLE: analysis of their objectives and outcomes;
 - integration of information obtained from questionnaire and projects identified;
 - analysis of the obtained results and conclusions.

3. Questionnaire design for data collection

A comprehensive questionnaire has been developed to collect data for existing educational programmes in transport and logistics. The questionnaire has been divided into three parts as follows:

Part 1 – general information about the respondent; his/her institution, address of the institution; department responsible for the programme(s); programme/course coordinator(s);

Part 2 – general information about the programmes and courses offered and delivered; number of students enrolled per year; credits given; compulsory versus optional disciplines/modules;

Part 3 – information about whether the given institution conducts railway and logistics-related research activities and also whether there are any students/staff exchange activities in place, followed by section for comments and suggestions, if any.

In particular, regarding part 2, the respondents were asked to characterise their programmes choosing one or more of the following topics related to the programme: Transport engineering, Railway engineering, Civil engineering, Freight transport and logistics, Economics or to add a new topic, which better represented the programme. Moreover, within each topic, the institutions were asked to list compulsory and optional disciplines taught in their programme in order to better characterise it.

The questionnaire was uploaded to SuperSurvey website on January 2011 and stayed one month online. The survey link was circulated by e-mail to all potential respondents from databases of the RiFLE team, introduced by a short description of RiFLE project and invitation to liaise and share their experience with master programmes in transport and logistics by taking part in the survey. Moreover, to some potential responders, the survey was sent directly in Excel format by e-mail.

The questionnaire received 42 responses in total, 15 out of 42 were complete. Figure 1 shows number of responses versus countries: the highest number of responses comes from the UK, followed by Italy.

The results obtained from the questionnaire provided a flavour of the current situation with educational programmes in transport and logistics; however, the sample of data collected by the questionnaire was considered unsatisfactory for the purposes of the project. Therefore, it was decided to identify similar project as RiFLE, if any, and analyse their outcomes.

4. Identification of similar projects as RiFLE and integration with information obtained from projects

The following projects have been identified:

- EURNEX (EUropean rail Research Network of Excellence) includes some 47 scientific institutes in the area of transport with particular expertise in rail research all over Europe with the purpose to con-

- tribute to a more competitive future European rail system by providing excellent research and education organised in scientific poles of excellence (EURNEX);
- TUNRAIL (Transatlantic Project in Railway Education) was a policy-oriented measures project, funded by the ATLANTIS programme, intended to ‘tune’ and intensify the railway higher education knowledge exchange and collaboration between the EU and the USA. More specifically, this project investigated the current rail programmes to identify similarities and differences between railway systems and educational programs and to provide a solid foundation for more extensive cooperation and the establishment of new rail programmes on both sides of the Atlantic (TUNRAIL);
 - FUTURAIL, a FP7 project aiming to contribute to the enhancement of the railway sector by fostering a better match between the human resources needs to make railways a more competitive and innovative sector and the offer of skills coming out of the different research-based education and training institutions across Europe (FUTURAIL);
 - SKILLRAIL, a FP7 project that aims to design and launch a sustainable framework, EURAIL ‘European University of Railway’, for creation, dissemination and transfer of knowledge within the railway sector (SKILLRAIL).

Some data collected within the TUNRAIL project were incorporated into RiFLE analysis. They allowed to increase the sample of the collected data to 72, where 45 out of 72 were complete. Figure 1 shows this graphically. In this case, the highest number of respondents belongs to Germany, followed by the UK and Spain.

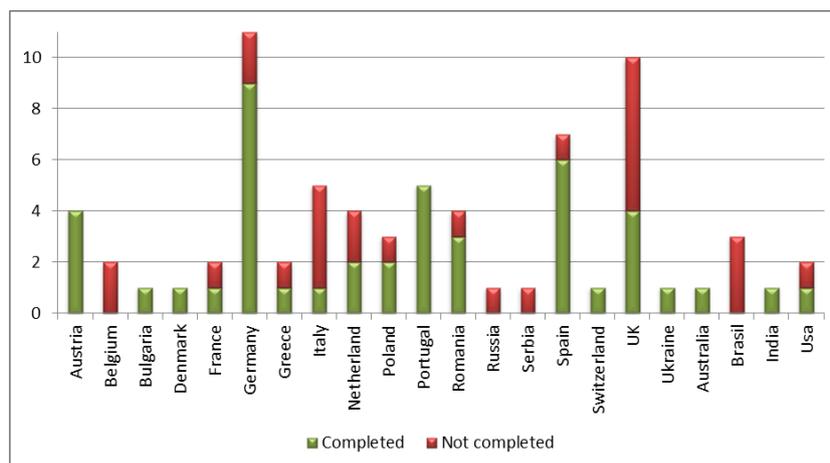


Figure 1. Database integration: number of received responses versus countries

5. Analysis of the obtained results and conclusions

A cluster analysis has been conducted that concluded that Freight Transport & Logistics and Economics-related topics are scarcely represented in the master programmes under study. Our analysis suggests that courses to address such topics appear to be rather limited, which is an interesting finding. Figure 2 shows a representation of a relevant topic in the programmes under study (in %). Note that Freight transport & Logistics and Economics are far less represented than Railway and Transport engineering.

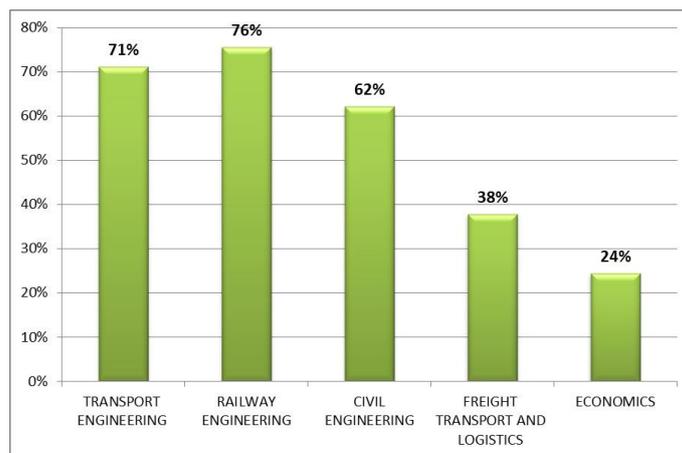


Figure 2. Relevant topics in MSc programmes in transport and logistics

This conclusion is also confirmed by the fact that only 47% of investigated institutions cooperate with companies active in the logistic sector, whereas 80% of these Institutions collaborate with railway companies (see Fig. 3).

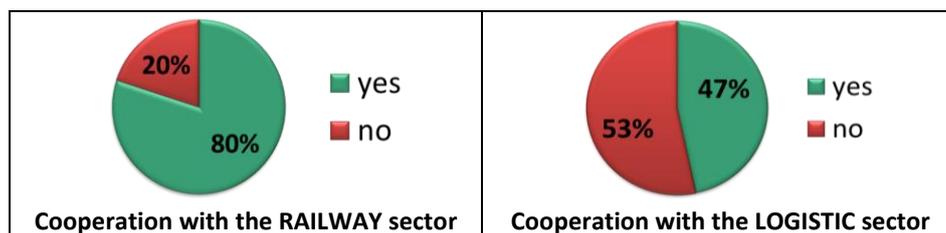


Figure 3. Rate of investigated institutions which cooperate with the RAILWAY and the LOGISTIC sectors

Moreover, the collected modules (both compulsory and optional) have been grouped in clusters of disciplines (Transport Engineering, Railway Engineering, Civil Engineering, Freight Transport and Logistics, Economics, Mechanical Engineering, Environmental Engineering, Information and Communication Technology, Mathematical and Statistical Methods and Tools, Human Factors and Sociology and Interdisciplinary subjects). This exercise allowed to create define a comprehensive framework of transport and logistics curricula, which represented a fundamental input to the subsequent development of the RiFLE MSc.

In Table 1, compulsory and optional modules frequently offered in master programmes in railway engineering are listed. Rail freight and logistics module is not mentioned. Meanwhile, it appears that such a module is neither provided in master programmes in freight transport and logistics, which suggests that a niche and a need for it exists.

Table 1. Compulsory and optional modules in railway engineering course

Railway Engineering	
Compulsory Modules	Optional Modules
1 Fundamentals of Railway Engineering	1 Advanced Railway Technologies
2 Rail Control and Signalling	2 Maintenance of Railway Systems
3 Rail Infrastructure	3 Railway Traffic Management
4 Railway Operations	4 Rail Freight Yards
5 Railway System Design	
6 Railway Operations Safety	
7 Rail Passenger and Freight Terminals	
8 Railway Vehicles	

Finally, another interesting result is that 87% of the analysed programmes provide opportunities for student and staff exchange, which highlights high levels of mobility in transport and logistics higher education. This could be a good starting point for the possible future extension of the developed Rail Freight and Logistics Curriculum out of the four institutions participating in RiFLE project.

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