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Objectives and results of project UMi-TWINN

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Abstract: In 2016 a new H2020 project have been started (UMi-TWINN), which targeted, among others, to increase the scientific excellence and research capability of the University of Miskolc in the field of logistics. During the project duration, main activity was the knowledge exchange among the scientific project partners, which are the Fraunhofer Institute for Factory Operation and Automation, the Institute of Engineering Logistics of TU Graz and the Institute of Logistics of the University of Miskolc. In this paper we gave an overview about the activities (project workshops, summer schools, conferences, trainings, etc.) and the results (conference and journal papers, books, new education materials, new project proposals, etc.) of the project UMi-TWINN, and their significance in the industrial processes and other economy sectors.

Keywords: EU project, UMi-TWINN, logistics, cooperation, research

1. Introduction

There are many scientific tasks related to all fields of the international industry and economy, but the local characterizations (e. g. effects of industrial regions) limit the possibilities of the different research institutes. The knowledge levels and research performances of the institutes are largely depend on the tasks which they got from the

industry. In the aspects of possibilities sufficient differences can be existed among the different research institutes, which influence their results and successes.

There are many EU project types to reduce these differences among the institutes of the different regions. One of them is the Horizon 2020 program, where the UMi-TWINN project (No 691942) helps the University of Miskolc. In this paper we present the details and the most important results of the UMi-TWINN project.

2. Description of project UMi-TWINN

The overall aim of project UMi-TWINN is to reinforce the scientific excellence and innovation capacity in logistic systems of the University of Miskolc (UMi) and its high-quality Twinning partners for the benefit of different industries and logistics market. To achieve this aim, the 3 years project built upon the existing strong research and innovation base of UMi and its twinning partners Fraunhofer-Gesellschaft e.V. IFF (Fraunhofer), Technische Universitaet Graz (TU Graz) and Intelligentsia Consultants (Intelligentsia).

The UMi-TWINN project aims to boost UMi and twinning partners' scientific excellence and innovation capacity in logistics technologies, as well as implementing a research and innovation strategy focused on three sub-topics [1]:

1. Design of logistic systems and networks
2. Intelligent transport systems
3. Dynamical analysis of materials handling machines

Participants of the project:

- **UMi** is the third largest institution of higher education in Hungary, with almost 1200 employees including 720 researchers [2]. The Institute of Logistics has a wide range of research and development activities, such as: dynamical analysis of materials handling machines, computer integrated logistics, information logistics, design of logistic systems and networks, production and service logistics,

warehouse logistics, stock management, recycling logistics, quality assurance logistics, maintenance logistics, global logistics, supply and distribution systems, logistics management, intelligent transport systems [3].

- **Fraunhofer IFF** is engaged in applied research and development since its foundation in 1992 [4]. The institute's core competencies are reflected in its institutional divisions Logistics systems and networks, Virtual development and training, Information logistics, Production and plant management as well as Automation. Clients include contracting authorities and international industrial corporations as well as small and medium-sized enterprises, e.g. from mechanical and plant engineering, the aircraft industry, shipbuilding, medical technology or the automotive industry [5].
- **TU Graz** wass ranked 151-200 worldwide in the international Shanghai ranking under the subject 'Engineering/Technology and Computer Sciences' (2014). TU Graz pursues top teaching and research in the fields of science and engineering [6]. An integral part of putting together excellent education and training programs is knowing about the needs of society and the economy. The quality of the education and training at Graz University of Technology is carried by the strength of its knowledge-oriented and applied research [7].
- **Intelligentsia** is well-experienced in providing high-quality training services to support science, technology and innovation in the public and private sectors [8]. Notably, the company has worked on over 20 FP7 and H2020 projects with Central and Eastern European research institutes concerning the development of centres of excellence, integration into ERA, and technology transfer (e.g. FP7 AdM-ERA, FP7 CEOSeR, FP7 NANOSENS, FP7 IPERA, H2020 INTELUM and H2020 HEALTH-TECH).

The research and innovation strategy takes the recent SWOT analysis of UMi as well as the national Hungarian research priorities and regional Smart Specialisation Strategy

'Advanced technologies in the vehicle and other machine industries' as well as the SMART technologies relevant to the Borsod-Abaúj-Zemplén county (e.g. 'Logistics' and 'Special materials, advanced materials, modern materials technologies') into account. The specific objectives of the UMi-TWINN project are presented below [9]:

- Strengthen UMi's research excellence in Logistics
- Enhance the research and innovation capacity of UMi and Twinning partners
- Raise the research profile of UMi and the Twinning Partners
- Contribute to the research and innovation priorities of Hungary
- Support research and innovation on a European level

3. Project activities

Main activity of project UMi-TWINN was the organization of staff exchanges among the scientific partner institutes, to help knowledge transfer [10]. To achieve the main objectives, staff axchanges were realized in four directions (from LOG to IFF, from LOG to ITL, from IFF to LOG and from ITL to LOG), where 60% of the visits are done by the staff of LOG. During the project duration (39 months), 68 different visits are done by the staff of the partner institutes, 49 persons were involved into the project and totally near 60 mobility months were used for this purpose. Mobility types during the staff exchanges (Fig. 1) were:

- **Introductory visits**, where the staff of the partner institutes met with each other and presents their abilities and research activities.
- **Trainings**, where the staff of IFF and ITL visited LOG to make trainings for the staff and students in certain research topics.
- **Research visits**, where the staff of LOG took part in the research activities of the IFF and ITL to study their methods and devices.
- **Personal knowledge exchanges**, where the staff of scientific partner institutes visited each other for personal consultation in certain scientific topics (e. g. joint papers).

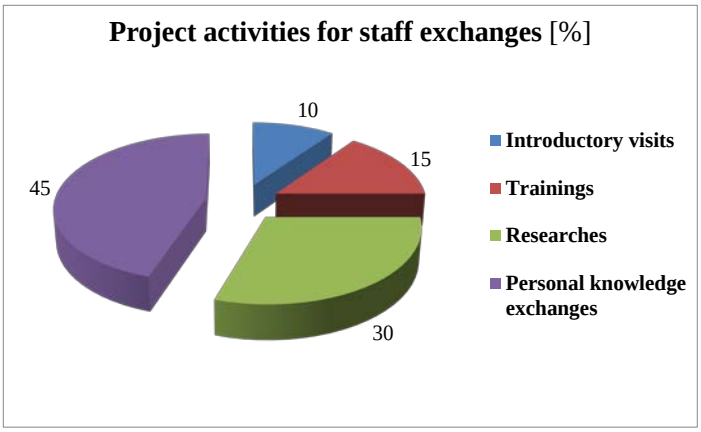

Figure 1. Distribution of the project activities among the different types (created by the author)

Significant part of staff exchanges in project UMi-TWINN was the training of researchers of the partner institutes. Suited to the project objectives, mainly the staff and students of LOG gained new knowledge on trainings.

On the different events and activities of the project, totally 20 trainings were organized for researchers, students and administrative persons of the University of Miskolc (Fig. 2). Topics of the trainings were related to the project research fields and EU projects [11, 12].

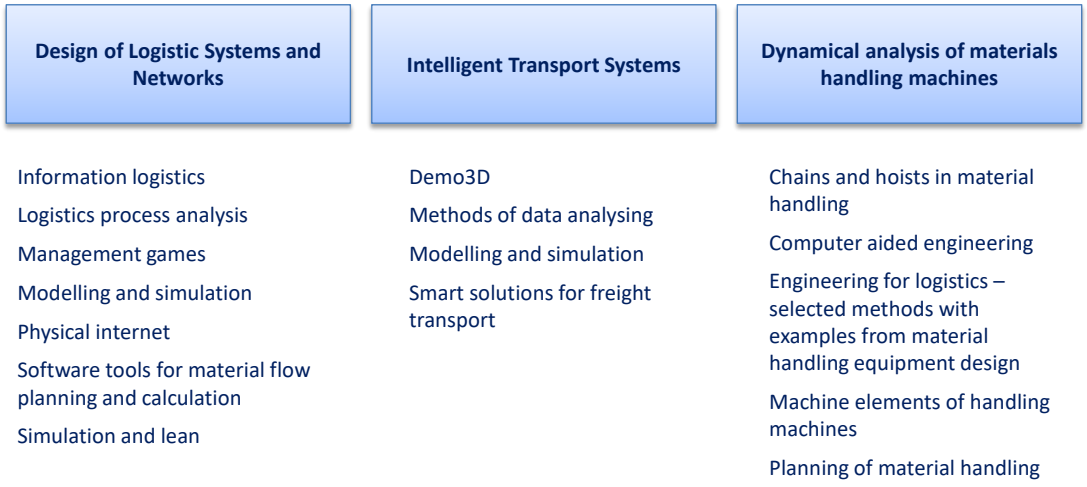

Figure 2. Professional training topics of the project (created by the author)

During the project duration, there were four different activities for trainings:

- Training visits, where staff of IFF and ITL visit LOG and present different topics related to the project fields.
- Trainings during research visits, where staff of LOG was trained at IFF and ITL, during their long term staff exchanges.
- Trainings on Project Workshops, where staff of the partner institutes trained the participants of the workshops in certain topics.
- Trainings on Summer Schools, where students and researchers gained knowledges in project related topics.

At the starting of project UMi-TWINN the coordinator Institute LOG undertook to organize workshops (Fig. 3), where the project partners can take contact to industrial companies and research institutes of Hungary.

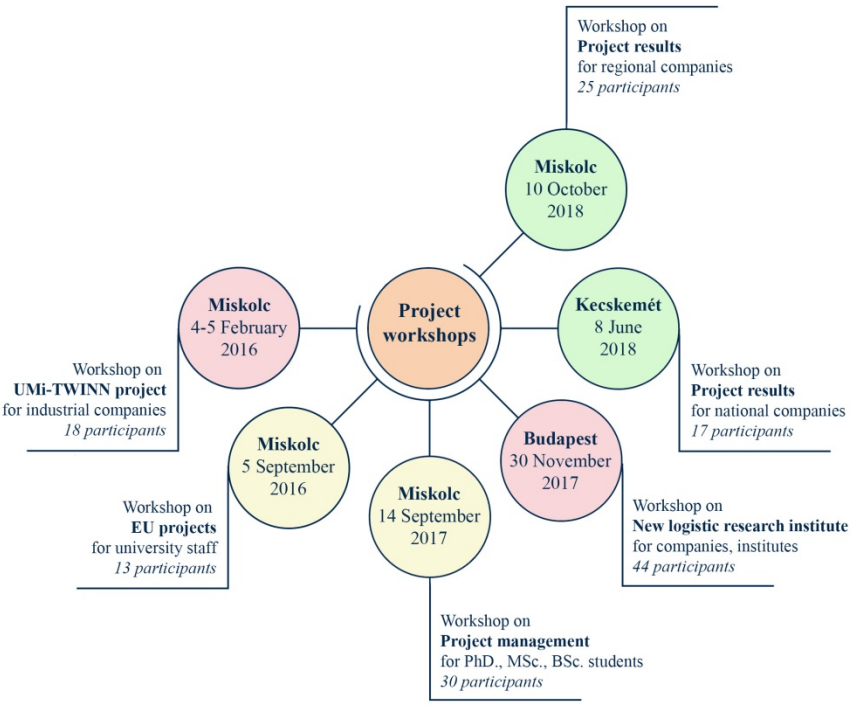

Figure 3. Workshops of the project (created by the author)

During the project duration, 6 workshops were organized for different purposes, as the contact building, the informing, training and discussion on certain topics and the dissemination of the project results. Topics and presentations of the workshops were suited to the actual project task, for totally more than 100 participants.

Beside the short workshops, which targetted mainly to the industrial companies, project partners organized Summer Schools for students and employers of the companies. On these one or two week-long events, participants from different countries gained knowledges about the most advanced devices, techniques, methods, research results and future tendencies in the field of logistics. All three scientific partner institutes organized one summer school in their home country, presented their special aspects and state of the art. Task of the Summer Schools was not only to give scientific knowledge to the participants, but to present the home institutes and their local areas. To realize this concept, the participants of the events can took part in social and cultural events beside the lectures and company visits. During the Summer Schools totally 64 participants visited 9 industrial companies in the three countries and trained on 22 lectures related to the logistics.

4. Project results

One of the most important indicator of project UMi-TWINN is the number of the scientific publications. During the project duration, more than 190 papers have been published by LOG in different international and national journals and conference proceedings. At the starting of the project, partners targetted to publish joint papers by the staff of the partner institutes. Until the end of the project 13 joint papers have been published, 10 papers in international journals, and 3 papers on different conferences.

To measure the performance of the project we compared the number of papers published by the staff of LOG during the project duration and the published papers in the previous three years (2013-15). As a result, the number of scientific papers of the staff of LOG increased by 86% during the project UMi-TWINN (Fig. 4).

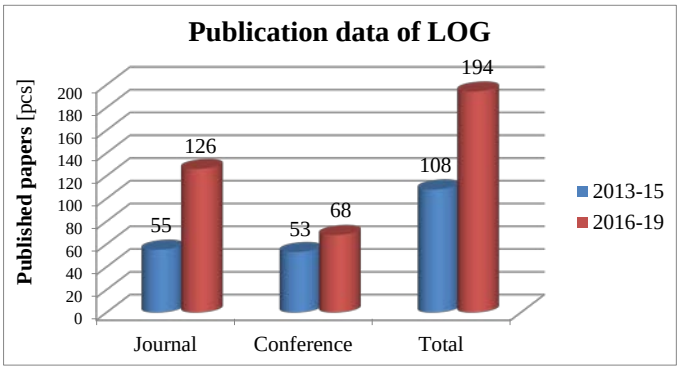

Figure 4. Publication data of the project (created by the author)

Important part of project UMi-TWINN was the increasing of the reputation of the University of Miskolc. To achive this objective, during the project duration staff of the partner institutes took part on more than 20 international conferences to present the abilities of the university in the field of logistics and disseminate the project UMi-TWINN. On these conferences, project partners presented 63 scientific papers and 5 project presentations. Beside it, some of the conferences gave the opportunity to show the project poster and share project leaflets to the participants.

The project coordinator LOG organised an international logistics conference on the 22th of May 2017 at the InterContinental Hotel in Budapest (Hungary). The "Industry 4.0, Logistics 4.0: Challenges and opportunities" conference was the first of its kind and focused on logistic aspects of the Industry 4.0. The 14 relevant presentations attracted about 80 participants from research organisations, the industry as well as Hungarian stakeholders and policy-makers. All the UMi- TWINN partners participated to the conference which were important project indicator.

It is hard to measure the performance and real effects of a twinning project, so we described some impact indicators to evaluate the results. Impact indicators gives feedback about three different aspects of the project, which are the scientific excellence, the research capabilities and the education level. We summarised the most important impact of the project in Fig. 5.

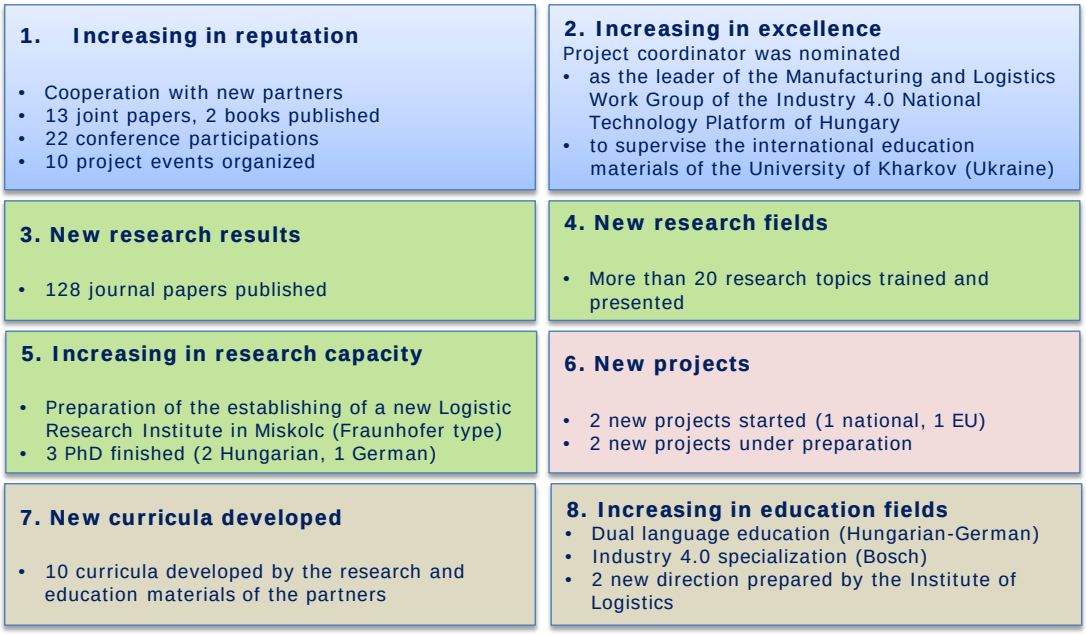

Figure 5. Impact indicators of the project (created by the author).

5. Conclusions

The main objective of the project (described in the project proposal) was to increase the research and knowledge levels of UMi. The above described facts, numbers and indicators show that this objective was achieved during the project duration. Beside the numbers and facts many new contacts and cooperations have been realized during the last three years, which mirror in the published papers and conference presentations.

Next main task of the UMi and of course also the partner institutes is finding opportunities to continue the cooperation and the research works which started during project UMi-TWINN. At this moment we are preparing new H2020 projects (e. g. Marie Skladowska-Curie Actions) and working joint research topics related to different areas of the logistic fields.

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