ALLIANCE Fact Sheet Nº 4:

A preliminary survey on transport interchange design and operation

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Background and content

Transport interchanges facilitate intermodal activities, i.e. transferring from a long to a short distance network, from interurban to urban distribution, referred to as “last mile”, through shift of transport modes and/or vehicles. The efficient operation of interchanges is dependent of the knowledge level, the skills and competence on a wide range of topics, including governance and policy formulation, smart solutions applications and decision-making techniques.

The scope of the 4th ALLIANCE fact sheet is to reveal the main findings of a preliminary survey on transport interchange design and operation, which was designed and implemented by the Traffic, Transportation and Logistics Laboratory of University of Thessaly, Greece and the Transport and Telecommunication Institute, Latvia.

Survey set-up and data collection

The aim of the survey was to investigate relevance of existing knowledge, importance and requirements for skills and competence on interchanges’ design and operation, as perceived by Latvian stakeholders, including policy makers, transport operators and service providers, and academia.

Data were collected through a questionnaire survey, carried out via SurveyMonkey (https://www.surveymonkey.com/), and structured in three parts:

- Part I of the survey aimed to assess the relevance of 12 topics that have been identified as educational requirements for sustainable transport interchanges *(1)*. The research questions formulated, are:
    - Q1: How important is to have knowledge on the 12 topics?
    - Q2: How familiar are you with methods/techniques relative to the 12 topics?
    - Q3: During your university studies, at what level have you developed skills on the 12 topics?
    - Q4: How important would it be for your career development to gain skills on the 12 topics?
- Part II aimed to assess 15 emerging topics in the domain of intermodal transportation *(2)*, *(3)*. The relevant research questions addressed in this case, are:
    - Q5: At what level each of the 15 emerging topics has been introduced in your profession (or studies, when respondents were students)?
    - Q6: How important would it be for your career development to gain skills on the 15 emerging topics?
- In Part III, background information was collected about the respondents, including aspects such as: stakeholder category, gender and age, level of completed studies, etc.

Responses were given in a 1-5 Likert scale, where 1 represented the lowest rating (not important at all/not at all/very poor) and 5 the highest rating (absolutely essential/extremely/very high). The topics investigated and their grouping in 3 thematic areas: governance and operation (***A***), smart solutions (***B***) and decision-making (***C***), are presented in Table 1.

Table 1: Questionnaire topics *(1), (2), (3)*

No.	Educational requirements	Thematic area	No.	Emerging topics	Thematic area
1	The European policy on intermodal transportation		**1**	Utilization of big data for policy-making	
2	Building business models for intermodal transport interchanges		**2**	Innovative organizational and governance concepts for mobility solutions at neighbourhood and district level	
3	Sustainable development and transportation planning		**3**	Public procurement of innovative sustainable transport and mobility solutions in urban areas	
4	Operation and management of intermodal transport systems	***A***	**4**	Optimization methods improving resilience of interchanges (i.e. under unexpected events)	
5	Optimization of intermodal transport systems		**5**	Incorporation of Vehicle-to-Infrastructure (V2I) and Infrastructure-to-Vehicle (I2V) systems and information-sharing in efficient operation and management of interchanges	***A***
6	Intelligent services for passenger transportation		**6**	Benefits of connected-automated vehicles in the operation and management of interchanges	
7	Information systems of intermodal freight transportation		**7**	Shared-use services and solutions promoting interchange sustainability	
8	Design of passenger transport interchanges	***B***	**8**	Unmanned aerial systems in logistics	
9	Design of freight transport interchanges		**9**	Innovative design methods and green buildings at interchanges	
10	Smart technologies for efficient transport logistics		**10**	Incorporation of alternative fuel vehicles in smart transshipment	
11	Decision making methodologies	***C***	**11**	Promoting accessibility, inclusive mobility and equity in interchange design	***B***
12	Data collection methods		**12**	Physical and cybersecurity at transport interchanges	
			13	Information Communication Technologies and cooperative Intelligent Transport Systems for smart, safe, accurate and reliable interchange operations	
			14	3D printing in supply chain	
			15	Collection, storage, processing and visualization of big data to support decision making in transportation	***C***
***A:** Governance and operation, **B:** Smart solutions, **C:** Decision-making*					

Preliminary results

In total 45 stakeholders participated in the survey. Figure 1 to Figure 4 present the profile of the participants.

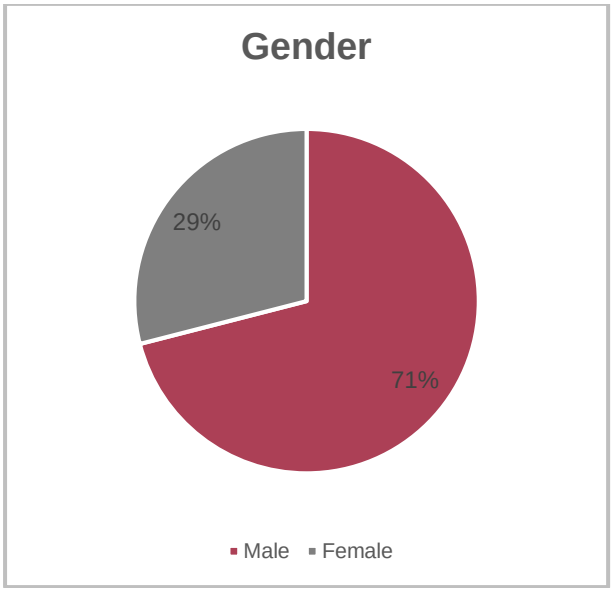

Figure 1: Gender distribution

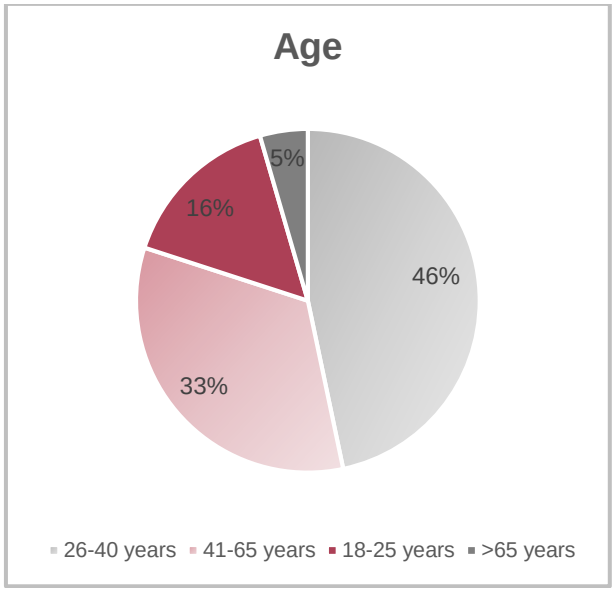

Figure 2: Age distribution

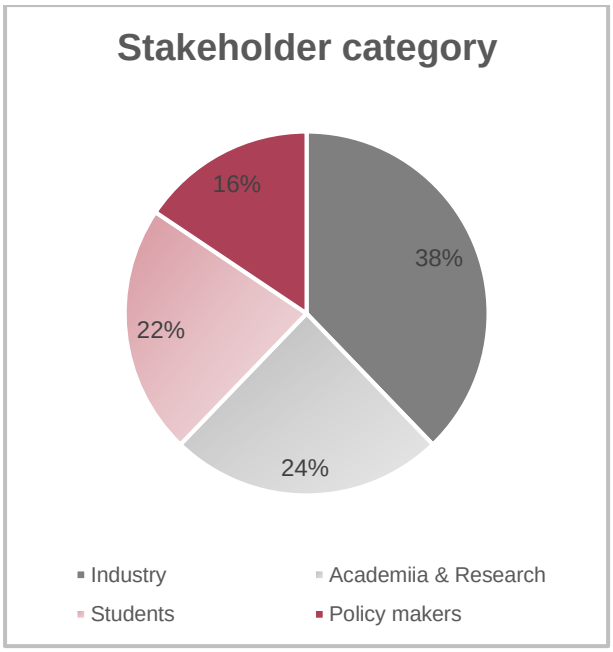

Figure 3: Stakeholder categories distribution

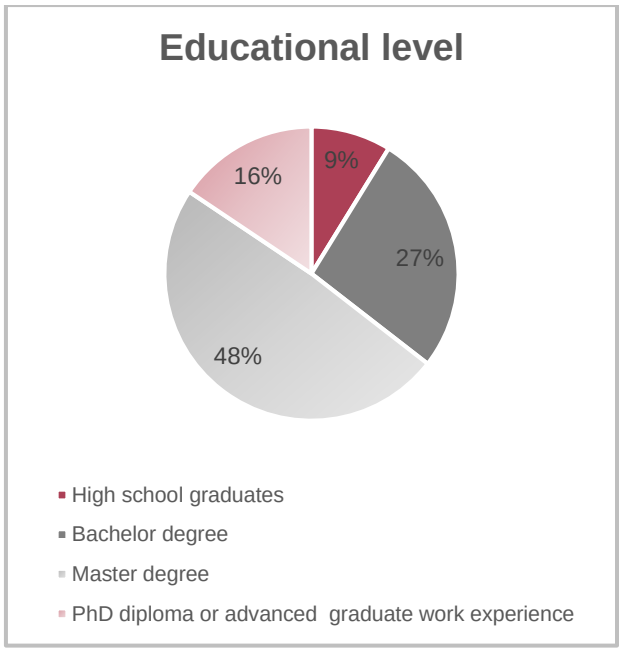

Figure 4: Educational level distribution

Sample was grouped according to several parameters, including stakeholder categories, gender, age, educational level and, also, the three thematic areas. A number of statistical tests were conducted, and some preliminary results are presented in the following paragraphs.

Bivariate correlation analysis was carried out among the six variables, as formulated by the relevant research questions (Q1 to Q6), and, indicatively, the correlation between the importance of knowledge on the 12 educational requirements and its importance for the respondents' career development, is shown in Figure 5. It's clear that respondents consider that high knowledge on the 12 educational requirements can enhance their career development.

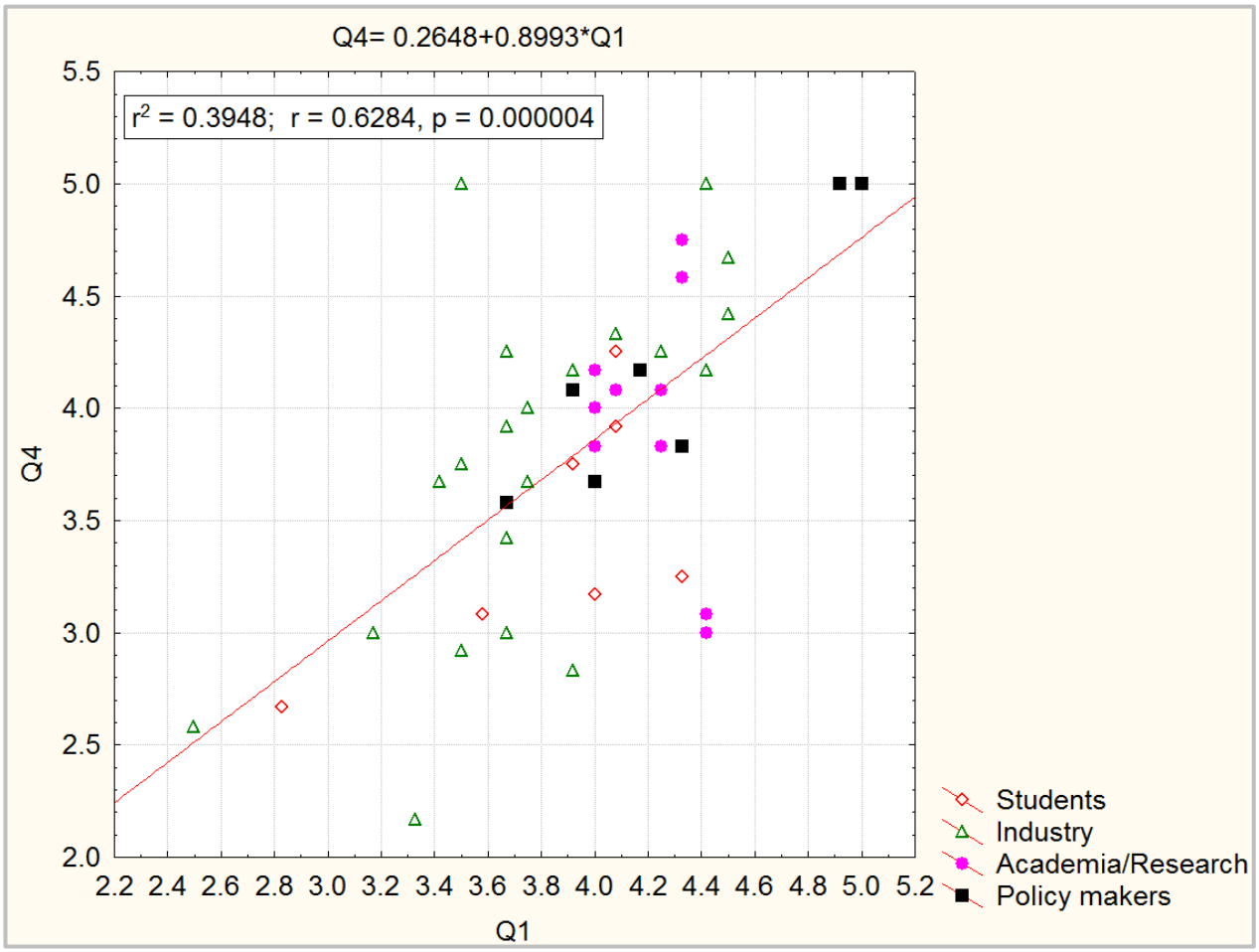

Figure 5: Importance of knowledge on the 12 educational requirements (Q1) and its importance for the respondents' career development (Q4)

In addition, Table 2 presents an overview of the average rating (M) and standard deviation (SD) of the above two variables and the test results of the comparisons between the three thematic areas, which are described through the z-statistic and p-value, indicating the strength of the respective evidence. Focusing on the importance of knowledge on the 12 educational requirements, results revealed that respondents rated higher those requirements addressing governance and operation (M=4.08, SD=0.55), then decision-making (M=3.96, SD=0.89), and

lastly, smart solutions (M=3.89, SD=0.56), with the differences between governance and operation and decision-making and also, between governance and operation and smart solutions, being statistically significant (p-value<5%).

When respondents were asked about the importance to have knowledge on the 12 educational requirements for the development of their career, they replied that knowledge on decision making topics (M=4.10, SD=0.96) would improve more their career compared to governance and operation (M=3.87, SD=0.76) or smart solutions (M=3.67, SD=0.79) topics.

Table 2: Average rating and comparisons among thematic areas

Variable	Thematic area						z-statistic		
	Governance & operation (***A***)		Smart solutions (***B***)		Decision-making (***C***)		***A*** vs. ***B***	***A*** vs. ***C***	***B*** vs. ***C***
	M	SD	M	SD	M	SD			
Q1. Importance of knowledge on the 12 educational requirements	4.08	0.55	3.89	0.56	3.96	0.89	**2.03***	**2.02***	-1.49
Q4. Importance of knowledge on the 12 educational requirements for career development	3.87	0.76	3.67	0.79	4.10	0.96	1.25	-1.76	**-2.49***

*M: Average rating, SD: Standard deviation, *statistically significant (p-value<5%)*

Conclusions

This survey investigated the relevance of the existing knowledge, importance and requirements for skills and competence on career development, in the area of designing and operating transport interchanges, taking into consideration the perceptions of different stakeholders: policy makers, transport operators and service providers, and academia.

Interesting findings were revealed from the preliminary analysis of the results, which, when enriched with the outcomes of the completed data elaboration, will set the ground for establishing an up-to-date educational and training program, meeting the expectations and needs of future professionals.

References

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