TRANSPORTA UN SAKARU INSTITŪTS

Scientific Activity Report

2020

This report provides information on the aims and objectives of the research activities for period, scientific outputs Transport and Telecommunication Institute – research papers, projects activities and initiatives, describes the local and international collaboration and knowledge events, as well as innovations and research to business and students works performed at the TSI.

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1. GENERAL INFORMATION

1.1. Mission, Vision

TSI new strategy for 2020 – 2025 has been adopted and designed to reflect TSI's ambition to be the leading private technical university in the Baltic Sea region and articulates TSI will make a difference to its students, to industry and to the higher education sector in the Baltic Sea region.
The mission of the Transport and Telecommunications Institute is to create and disseminate knowledge and make a positive difference to our community and the wider Baltic Sea region.

Our vision for the Research Strategy is:

Our developing research culture will dovetail with our approach to teaching, learning and assessment, with our research informing our teaching and providing opportunities for our students – both undergraduate and postgraduate – to engage with our research activity and our research-active staff. Our research activities will be critical to our ability to produce graduates who can address the industrial demands of the 4th industrial revolution and its impact on industries, markets and society.
The University Research Strategy is presented under five main objectives:

- **OBJECTIVE 1**
  To conduct high quality impactful applied research that will strengthen our reputation as the leading private technical university in the Baltic Sea Region.
- **OBJECTIVE 2**
  To develop internationally recognised research and innovation active staff.
- **OBJECTIVE 3**
  To create a critical mass of research-active staff and establish a pipeline of future research staff.
- **OBJECTIVE 4**
  To establish an appropriate number of focused, multi-disciplinary research clusters that address key issues facing society with the potential for national and international impact.
- **OBJECTIVE 5**
  To celebrate our successes and promote our achievements globally.

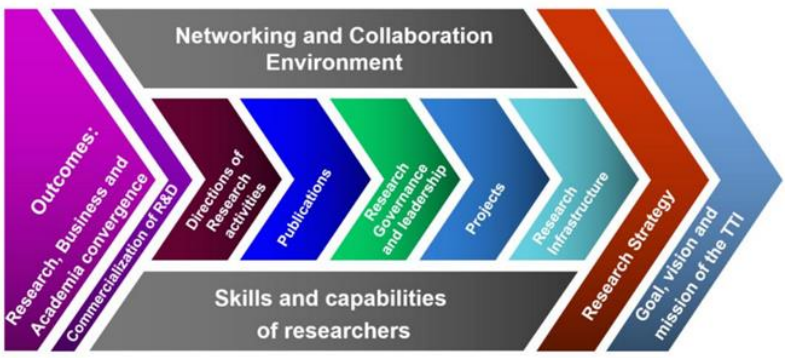


Figure 1 Framework for development of the research program of TSI

1.2. Research Infrastructure

The TSI research infrastructure managerial and policy-making institutions are the Board, Rector, Vice-Rector for Academic & Research. The advisory and supportive functions are delegated to the three Councils: PhD & Research Council, Professor Council, Promotion Council. The primary external advisory body for the research in the Institute is the International Scientific Advisory Board: Prof. Nicos Komninos (Greece), Prof. Michael Schenk (Germany) and Prof. Andres Monzon De Caceres (Spain). Their role is to review research activities, provide insights for the key developments and events, provide advice on the challenges, propose funding opportunities and act as ambassadors for the Institute.
The Research Administration Department aims to support high-quality academic, scientific and applied research through leading the implementation of research strategy and policies, ensuring compliance with research governance and quality requirements, supporting researchers to access funding as well as form new collaborations and consortiums, engaging with the development of research processes and advising on the administration and management process. TSI Research Administration Department supervises key research partnerships and activities with international and national partners, public and private sector corporate clients according to best project management principles to maximize their effectiveness and works with a range of stakeholders to identify and realize new research opportunities.

All 17 laboratories of the TSI work in close collaboration with the management and Research Administration Department, Faculties and Research Clusters. The Figure 2 below presents a schematic structure of the research & development infrastructure of the Institute:

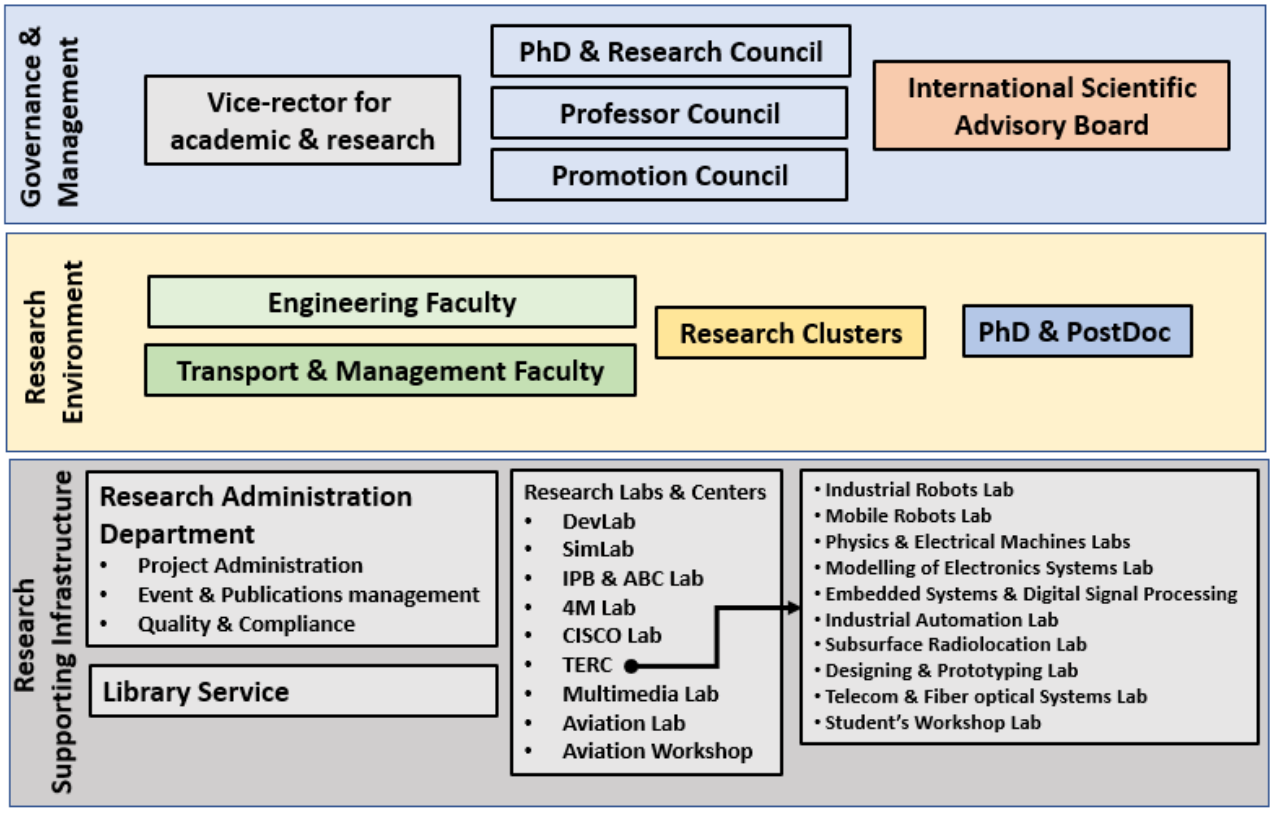


Figure 2 Research Infrastructure

The three new laboratories had been opened in the framework of the Centre in 2018 - Laboratory of Industrial Robots; Laboratory of Mobile Robots and Software and information system development laboratory, DevLab. The Industrial and Mobile Robots Labs were opened within the framework of the project No. 8.1.1.0/17/I/009 "Modernisation of Transport and Telecommunications institute STEM study programmes"; DevLab is TSI investment project for the development of applied research in the field of information technology and computer science; development and support of research at the Computer Science and Telecommunication Faculty as well as the implementation of TSI projects and applied research.

Laboratory of Industrial Robots
The laboratory is equipped with 4 industrial robots: the KUKA KR16 robot, the ABB IRB6600 robot, and two KUKA KR125 robots. The laboratory has a functioning segment of an automated production conveyor line, which includes sensors, actuators and control systems based on programmable logic controllers. The laboratory is intended to study the principles of design, operation and use of industrial robots in order to acquire the ability to program industrial robots to perform typical technological operations of robotic production.

Laboratory of Mobile Robots
Within the STEM project additional robotic arm setup consisting of “Universal Robots U3” (with gripper tool and camera) was added to the equipment of TSI in 2018 to provide learning opportunities for students to practise applied programming for industrial processes. Within the same project laboratory additionally was equipped with robots of the following brands: NAO 6 humanoid robots (6 pcs.), Khepera IV compact mobile robots (8 pcs.), Koala 2.5 mobile robots (3 pcs.). The personal computers of the laboratory have the software necessary for programming these robots. The laboratory is intended to study the principles of programming mobile robots, to implement and study existing and developed robot control algorithms: environment mapping algorithms, route planning and navigation algorithms, object detection and recognition algorithms, remote algorithms, artificial intelligence algorithms, etc.). Laboratory robots and software allow to learn the principles of creating mobile robots, to understand the features of the use of mobile robot information devices and to develop practical skills in the implementation of mobile robot control algorithms.

All laboratories are equipped with the latest software and hardware. They are widely used in academic and research activities of the Institute. Each laboratory is a collection of contemporary technical, software and methodological equipment and materials, which allows conducting classes with students at the edge of innovative research. Apart from the above-mentioned laboratories of Industrial Robots and Mobile Robots, the following laboratories are parts of the TERC.

Laboratory of Physics and Electrical Machines. The laboratory is equipped with training equipment of the company PHYWE, which helps exploring the effect of the fundamental laws of physics. At the same time, the electrical machine equipment from the manufacturer K&H MFG, helps to understand the principles and work of modern electric motors.

Laboratory of Modelling of Electronic Systems. The laboratory is equipped with a wide range of applied software allowing simulation of the work of electric circuits and the designing of printed circuit boards. The list of available programs consists but not limited to: Electronic Design Automation package OrCAD; Functional Modelling (Simulation) System Proteus VSM; Modelling (Simulation) System of Industrial Standard NI Multisim; Graphical Programming System NI

LabVIEW; Designing System for Microcontrollers AVR Studio; Designing System for PLIC (programmable logic integrated circuits) Xilinx ISE WebPACK.

Laboratory of Embedded Systems and Digital Signal Processing. The laboratory is equipped with special debug kits with modern microcontrollers such as AVR, Freescale, STMicroelectronics, as well as programmable logic circuits XILINX. The equipment of laboratory allows designing and exploring digital signal processing systems and intelligent control systems.

Laboratory of Industrial Automation. The laboratory is equipped with Siemens control software systems and models of the production lines. The laboratory is designed for the research of the principles of industrial networks and engineering of the systems of automation based on industrial logic controllers. Industrial manipulator Kawasaki RS03N allows learning the principles of programming of industrial robots and exploring the features of integration of the robotic devices into the automated production lines.

Laboratory of Subsurface Radiolocation. The laboratory is equipped with the ground penetrating radar of the company GSSI and a set of options for the research of the roadbed. There is software RADAN 7, for processing the data of ground penetrating radar, installed in the laboratory. All the equipment of the laboratory allows exploring the methods of non-destructive quality control of road surfaces and carrying out of work to assess the quality of the laying road surfaces and detection of hidden engineering communications.

Laboratory of Robotics and Students' Research Work. The laboratory is equipped with a variety of modern measuring equipment made by the company HAMEG and a set of debug modules for microcontrollers, PLIC and signal processors. Software and hardware platform NI ELVIS II allow carrying out the research of the operation of electronic devices through physical, semi-natural and mathematical simulation. The laboratory contains a set of functional units of the robots from LEGO, Lynxmotion, Pololu and Parallax, which allows to create autonomous mobile robots and learn the principles of the construction of control systems of robotic facilities in the laboratory.

Laboratory of Designing and Prototyping. The laboratory is equipped with software and hardware of production the prototypes of the electronic devices, including CNC machine tool LPKF Protomat S63 to produce double-sided printed circuit boards. Soldering Equipment of the laboratory allows to carry out montage using PTH (Pin Through Hole) and SMT (Surface Mount Technology) technologies.

Laboratory of Telecommunications and Electro-Optical Systems. The laboratory is intended for students to explore the principles of the construction of telecommunications equipment: Global System for Mobile communications (GSM); Global Positioning System (GPS); Radio-Frequency Identification System (RFID); Optoelectronic Systems; Digital Telephone Networks; Radio Transmitting and Receiving Devices; Antenna-Feeder Devices.

Laboratory of Electronics. This laboratory is equipped with type setting fields for creating electrical circuits. All the research work is with the use of specialized laboratory measuring equipment.

Aside the Robotics Centre, six other laboratories function as part of the Transport and Telecommunication Institute. These six laboratories listed below encourage students engage in high-quality innovative research in the fields of IT, Digital Economy and Telematics:

Laboratory of Applied Software Systems of the Transport and Telecommunication Institute carries on research and offers consulting in the following fields: traffic, logistics and business processes. The research and analysis are fulfilled using nowadays simulation software. The software of the laboratory allows to do the high-quality, representative and many-sided analysis of the research systems. Such projects as the projects connected with the new bus station in Riga, three level flyover of South bridge model, Liepaja city traffic macroscopic model can be mentioned as a vivid example (see more on website las.tsi.lv).

Multimedia Laboratory. The laboratory is equipped with videorecording and editing equipment complex, which allows creating educational, informative and commercial videos. The filming process of video lectures for the purposes of distance studying, sound recording for video materials and their preparation for placing into e-studying environment takes place at the filming studio. Moreover, the conference presentations and lectures of the lecturers and guest lecturers are being broadcasted live on the internet.

Learn_IT Project Laboratory. The main goal of this Laboratory would be to test a set of tools that will help to increase the effectiveness of learning by supporting the high level of concentration in a manner adapted to the individualized rhythm of learning. The solutions offered under the framework of LEARN IT project may be a good alternative for traditional ways of stimulation of concentration and focus during the process of learning. The Learning Lab with software for mobile devices was developed so that it can be used to prepare personalized recommendations for each person who will be tested in this Laboratory.

4M Laboratory, which provides access to the students and staff of TSI to the latest literature and scientific journals. The library has electronic catalogue of all information entities and it is possible to search the necessary information via internet.

IPB & ABC Laboratory - Image Processing, Biometry & Automated Border Control Systems. Since 2017 TSI in cooperation with one of the industries & business leader – company X-InfoTech organized a new modern research laboratory. Analysis and processing of images (the same as - pattern recognition, machine vision, Image Processing, Pattern Recognition, etc.) is a modern trend - scientific direction supporting a huge number of applications related to monitoring objects and territories, medicine, artificial intelligence, security systems.

DevLab - Software and information system development laboratory. DevLab is challenge-based laboratory of Computer Science and Telecommunication Faculty, targeted on organizing creative teams of developers who able to deliver smart software solutions to industry, based on cutting-edge technologies. Laboratory unites researchers, students and industry to create innovative solutions, develops new industry-demanded skills in the area, empowers start-up thinking and makes any students ideas possible. We are giving unique possibility for students to be involved in real software development projects and develop own practical skills, staying in campus and receiving support from leading teaching and research staff of TSI. In our projects we are feeding software, web apps, mobile applications and robots with artificial intelligence, forecasting methods, natural language processing, chatbots, behavioral models, advanced data analysis, augmented realty, image and video processing.

1.3. TSI Research Clusters

TSI Research Clusters are recognised group of researchers whose research expertise is applied either to a common field or who are involved in collaborative research projects.

Research Clusters' Purpose

- Bring together and provide a supportive and stimulating collegial context for researchers, postgraduate students, and postdoctoral fellows working on topics of common interest, with the aim of increasing the research outputs of the TSI.
- Attract internal and external research funding for collaborative research, with the aim of being upgraded to a Research Theme or a Research Centre funded by the University.
- Generate, and promote awareness of, research opportunities for potential postgraduate students, and for research collaborations with staff and students in TSI and other universities.

Data Analytics and Artificial Intelligence research cluster

The Data Analytics and Artificial Intelligence research cluster is focused on data-based research, consultancy and training, including big data analytics, statistical modelling, natural language processing, and major aspects of artificial intelligence. The cluster's activities fill the gap between cutting-edge research and businesses across industries and sectors.
Applied areas of the cluster include (but not limited to) air transport industry, urban traffic flows, public transport, social media, spatial planning, inventory control and logistics.

1.4. Research Journals

Transport and Telecommunication Scientific Journal

Journal "Transport and Telecommunication" is a peer-reviewed open-access scientific journal, owned by Transport and Telecommunication Institute. This Journal is a source of information and research results in the full scope of transport science: modelling and planning the transport systems, technical means of transport; transport infrastructure, traffic control, intellectual transport system, telematic and also concerns the interdisciplinary questions: transport and the environment, safety in transport, quality and effectiveness of transport, interoperability and intermodality. The journal aims at addressing professionals in transport and telecommunication in different types of positions in the area of industry, research and academic institutions. The Journal is published quarterly in the electronic and printed version.

The papers published in Journal "Transport and Telecommunication" are included in the following scientific databases:

SCOPUS (since 2008, Vol. 9, No 1), Elsevier Database; De Gruyter Open; The Summon; Transportation Research Board; ProQuest; ProQuest Engineering Journals; ProQuest Illustrata: Technology; ProQuest SciTech Journals; ProQuest Technology Journals; CNKI Scholar (China National Knowledge Infrastucture); EBSCO Discovery Service; Google Scholar; Primo Central (ExLibris); SCImago (SJR), and many more.

The Figures below demonstrated the development process of the journal. The data are obtained from the Scimago Journal & Country Ranks (http://www.scimagojr.com/):

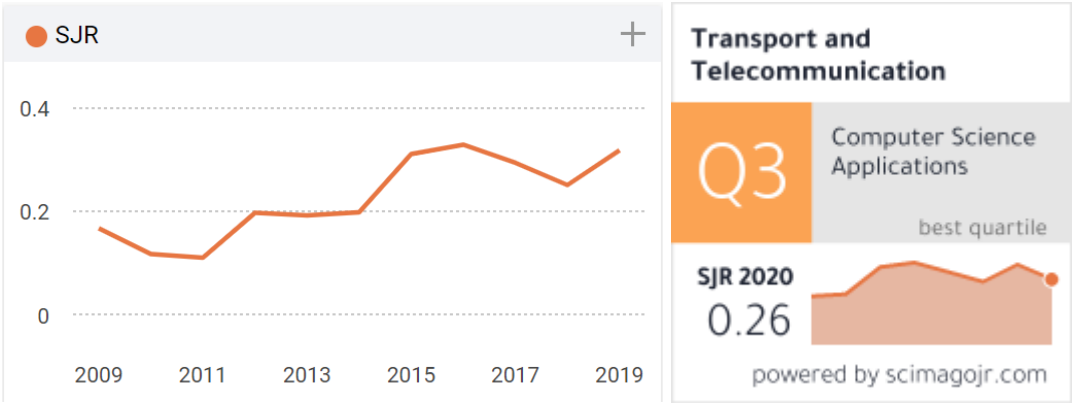


Figure 3 Transport and Telecommunication Journal performance (Scimago)

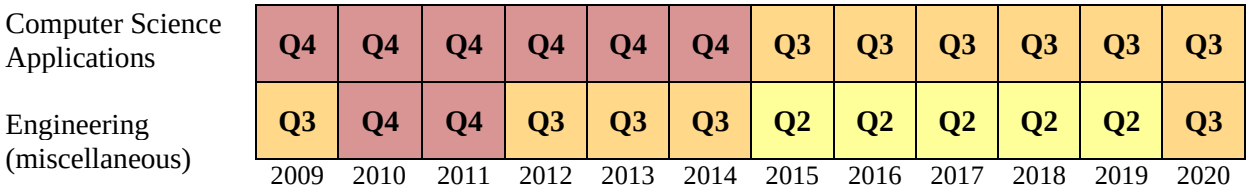


Figure 4 Transport and Telecommunication Journal performance (Scimago) (2)

The significant improving in journal position based on the KPI values included in following Table: (Table 1).

Table 1

Journal position based on the KPI

KPI	2020[1]
H-index of the Transport and Telecommunication Journal	**14**
SJR indicator	0.26
Cites per document (3 years)	1.311
International Collaboration	43.75%
Change the quality of the journal in following categories[2]: • Computer Science application • Engineering (Miscellaneous)	 Q3 Q3

Aside from "Transport and Telecommunication" journal, the TSI publishes a scientific peer-reviewed journal "**Computer Modelling and New Technologies**", which is also a quarterly scientific & research journal, ISSN 1407-5806, ISSN 1407-5814.

1.5. Research Staff

The research staff of TSI is registered in VIAA (State Education Development Agency Republic of Latvia) research staff database.

[1] Based on data from SCImago Journal & Country Rank http://www.scimagojr.com/ (data available for the year 2019)
[2] Based on data from SCImago Journal & Country Rank http://www.scimagojr.com/ (data available for the year 2019)

Figures 5 and 6 show the dynamics regarding research staff in TSI staring from 2013:

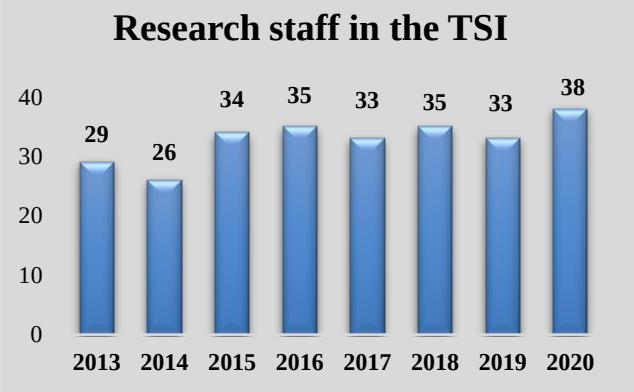


Figure 5 Research staff in the TSI

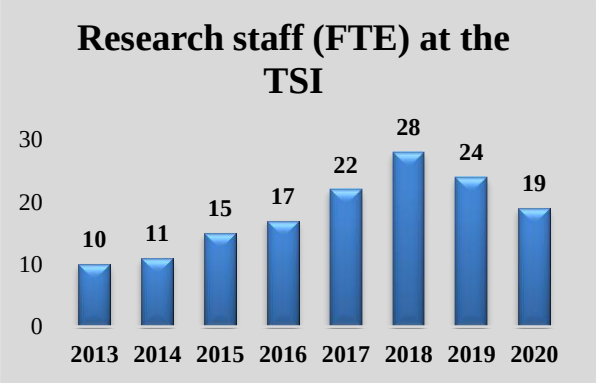


Figure 6 Research staff (FTE) at the TSI

Figure 7 shows the distribution of staff by type at the TSI:

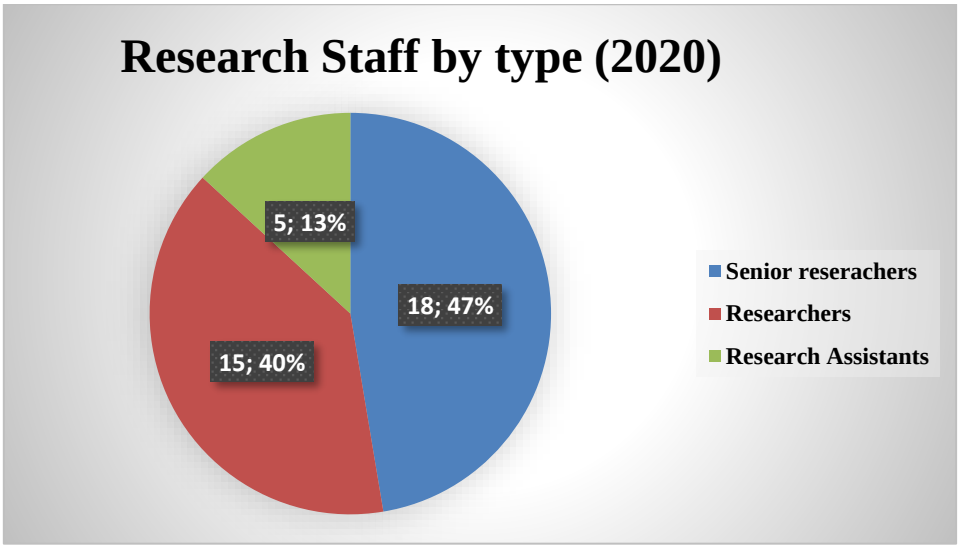


Figure 7 Research staff by type

2. RESEARCH OUTPUT

2.1. Number of scientific publications and other outputs

Table 2

Scientific publication / outputs, 2020

1. Original articles in anonymously refereed scientific journals cited in Web of Science & SCOPUS	45
2. Articles in other refereed scientific edited journals and conference proceedings	
3. Monographs published[3]	
4. Other scientific publications - proceedings[4]	13
5. Textbooks and other research-related publications	1
6. Patents/ including international	0
7. Computer programs and algorithms[5]	0
8. Registered cultivars	0
9. Conference abstracts	33
10. Visiting lectures/Online lectures	18
11. Articles, radio and television programs and journals popularizing science	8
12. Other[6]	0

Figure below shows publication statistics for the last seven years:

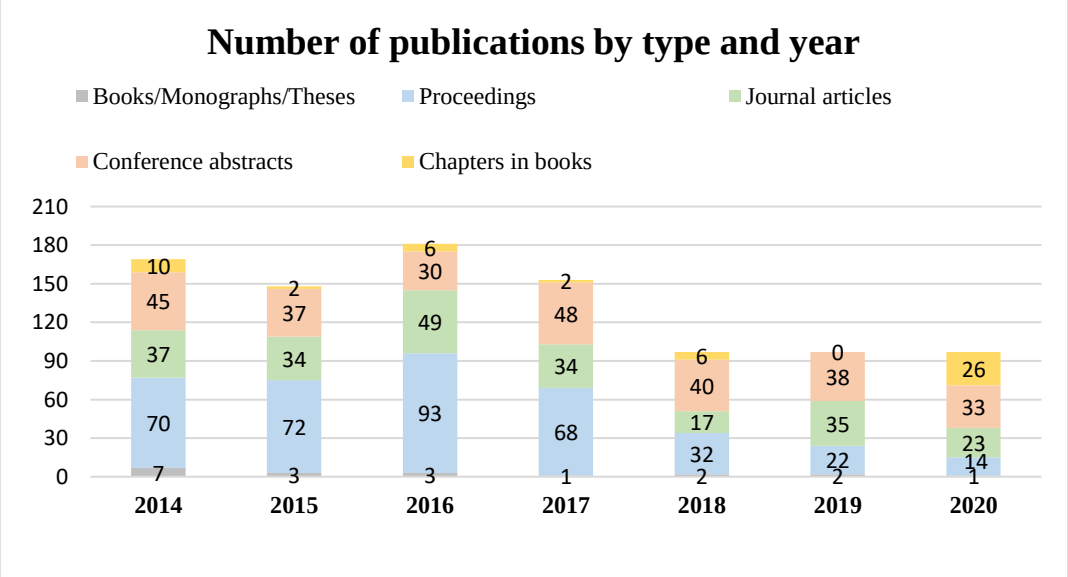


Figure 8 Publication performance and dynamics

[3] Includes doctoral theses and monographs.
[4] Includes edited proceedings, collections and special issues of scientific journals, and unrefereed scientific articles, excluding conference abstracts, chapters in books.
[5] Approximates the number of programs and algorithms that have been in use outside the unit.
[6] May include design products, prototypes, artefacts, exhibitions, performances etc.

2.2 Research Performance, based on Scopus Data

Table 3

Overall research performance

274 ▲ Scholarly Output ❄	100 ▲ Authors	0.72 Field-Weighted Citation Impact
643 Citation Count ❄	2.3 Citations per Publication ❄	7 *h*5-index

Note: This analysis provides an overall metrics summary of the institution. The snowflake means the metrics have been calculated using the Snowball Metrics methodology.

Publications by Subject Area

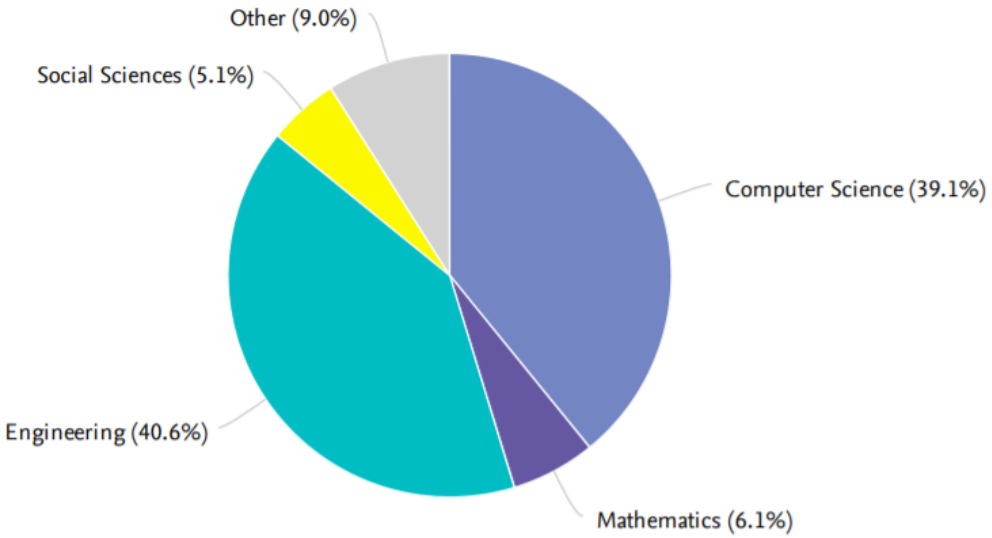


Figure 9 Publications by Subject Area

Field-Weighted Citation Impact

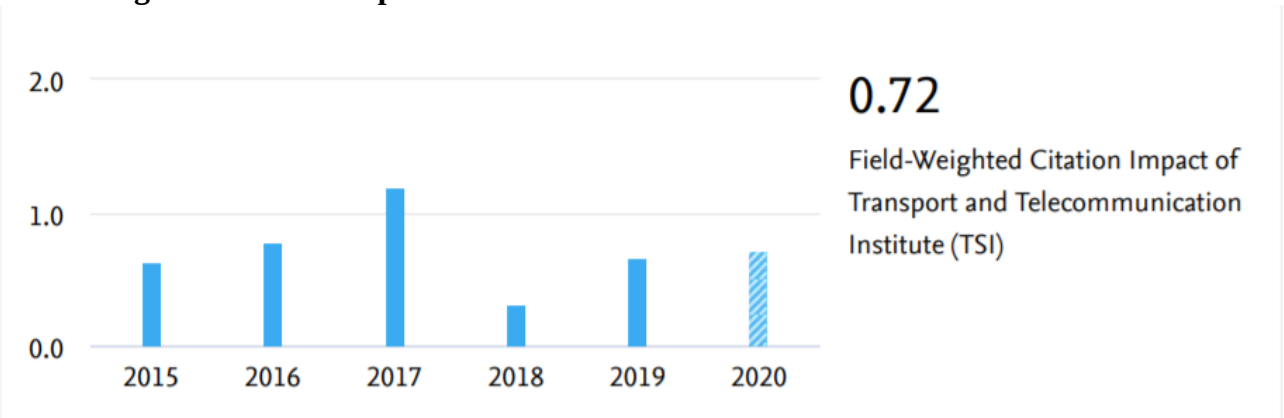


Figure 10 Field-Weighted Citation Impact

Note: Field-Weighted Citation Impact (FWCI) indicates how the number of citations received by the institution publications compares with the average number of citations received by all other similar publications in Scopus. A FWCI of 1.00 indicates that the institution's publications have been cited exactly as would be expected based on the global average for similar publications. A FWCI of more than 1.00 above average citations; for example, 2.11 means 111% more than the world average.

Collaboration

Scholarly Output at Transport and Telecommunication Institute (TSI), by amount of international, national, and institutional collaboration

Metric		Scholarly Output	Citations	Citations per Publication	Field-Weighted Citation Impact
International collaboration	33.2%	91	235	2.6	0.74
Only national collaboration	21.2%	58	122	2.1	0.67
Only institutional collaboration	23.0%	63	136	2.2	0.72
Single authorship (no collaboration)	22.6%	62	150	2.4	0.76

Figure 11 Scholarly Output

Note: Indicates the extent to which the institution's publications have international, national, or institutional co-authorship, and single authorship. A publication is assigned a single collaboration type.

Top collaborating Institutions

	Institution	Co-authored publications	Citations received for co-authored publications	Co-authors	Field-Weighted Citation Impact
1	University of Thessaly	21 ▲	32	8 ▲	0.52
2	University of Latvia	20 ▲	36	13 ▲	0.40
3	Fraunhofer Institute for Factory Operation and Automation	12 ▲	27	12 ▲	1.17
4	Riga Technical University	9 ▲	13	12 ▲	0.61
5	Vilnius Gediminas Technical University	8 ▼	10	7 ▼	0.39
6	Keio University	7 ▲	1	3 ▲	0.08
7	Otto von Guericke University Magdeburg	3 ▲	20	4 ▲	0.90
8	RAS - Institute of Control Sciences	3	11	1	1.07
9	Central Research Institute of Electric Power Industry	2 ▲	0	1 ▲	0.00
10	University of Duisburg-Essen	2	4	3	0.27

Figure 12 Top collaborating Institutions

Note: Shows the top institutions that have co-authored scholarly outputs with the institution.

Share of publications at Transport and Telecommunication Institute (TSI) that are among the most cited publications worldwide

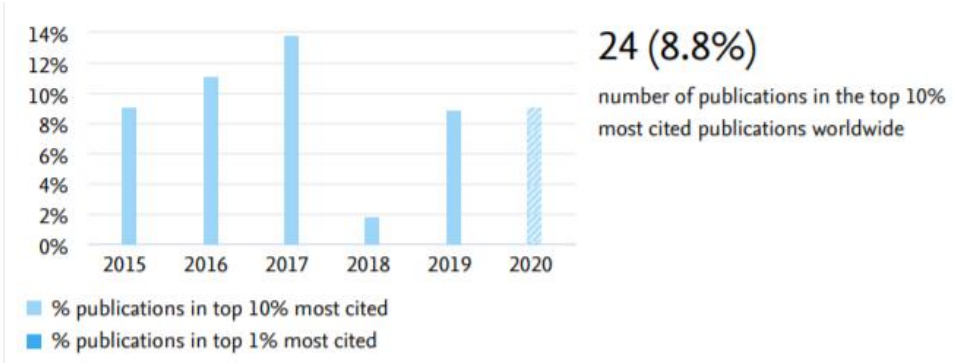


Figure 13 Most cited publications worldwide

Note: Outputs in Top Citation Percentiles indicates the extent to which an institution's publications are present in the top 10% most-cited percentiles within Scopus. This number is then field weighted to normalize for differences in subject area citation patterns.

Top Authors

Name	Scholarly Output	Most recent publication	Citations	*h*-index
1. Kabashkin, Igor	37	2020	104	7
2. Yatskiv (Jackiva), Irina	34	2020	74	7
3. Savrasovs, Mihails	17	2019	41	5
4. Pavlyuk, Dmitry	16	2020	53	7
5. Andronov, Alexander M.	16	2020	14	5
6. Tolujew, Juri	16	2020	49	10
7. Nechval, Konstantin N.	15	2020	39	9
8. Grakovski, Alexander	13	2020	22	4
9. Kuzmina-Merlino, Irina	13	2020	43	3
10. Krivchenkov, Aleksandr	11	2020	18	3

Figure 14 Top Authors

Note: The authors with the highest scholarly output from the institution, along with some metrics about them.

3. MASTER, PhD STUDENTS AND POSTDOC ACTIVITIES

3.1. Number of students

Table 4

Master and Doctoral degree students

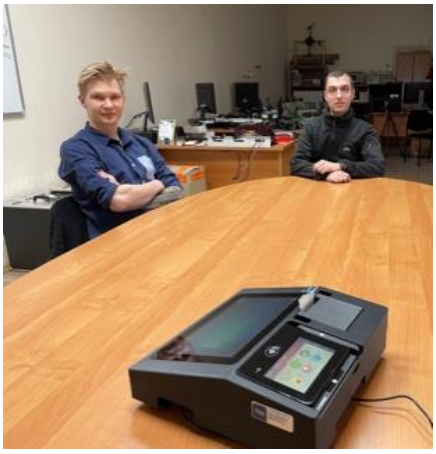
Position	2020
Completed their master's degree	53
Enrolled in doctoral studies	3
Active doctoral students	11

3.2. Students research work

TSI Involves students in research, starting from the first year.

Creation of innovative cash register demo device

Entrepreneurs often need the help of scientists to re-create or improve a product. In such cases they cooperate with scientific organizations.
Nikita Fatunov and **Nikita Ostrovenec** - study electronics only for the first year but have already managed to participate in the creation of a real electronic device. In addition to their studies, they also wanted to get involved in scientific and practical work to supplement the knowledge gained in their curricula at the Transport and Telecommunication Institute (TSI). The device is intended for small and medium-sized enterprises engaged in retail. One device had to combine all the necessary components for organizing the retail process: a cash register system, a check printer, a payment card terminal for contact and contactless payments and a customer display. When it came time to integrate the elements and test the finished device, curious students were also invited. Students took the components and assembled them in the housing. Check printers, tablets, payment terminals were connected to the board.



More information – read delfi.lv/campus/TSI!
https://www.delfi.lv/campus/raksti/stude-tikai-pirmaja-kursa-bet-jau-izstrada-inovativus-kases-aparatus-latvijas-tirgum?id=52907513

Development an accessory for a scanner (FARO S-series) that will be able to take panoramic photos during scanning process

The industry representatives "3D Engineering" come to Transport and Telecommunication Institute (TSI) with idea how the performance of scanner (FARO S-series) could be improved and give the opportunity to speed up 3D laser scanning process at least 2 to 3 times.
The main idea of the project was to develop an accessory for a scanner (FARO S-series) that will be able to take panoramic photos during (the same time) of scanning process. This project required a wide range of competencies in areas such as optics, electronics, signal processing, programming, software development, engineering, 3D modeling, 3D printing. TSI have involved students and leading researchers to provide the solution.
Artjoms Moskalovs *(Programmer at the Software and Information System Development Laboratory (DevLab))* was responsible for software part of solution.
Ivans Gercevs (*study Robotics, BSc, engineer at Telecommunications, electronics and robotics center*) developed main construction and create an encoder.

3.3. Scope of PhD program activities

TSI PhD Degree Programme "Telematics and Logistics" is a long-standing successful state-accredited third level higher education programme.

In 2020, 3 new candidates were accepted to the PhD program of TSI: Dolle N. (supervised by Kuzmina-Merlino I.), Susanin V. (supervised by Kabashkin I.) Zhdanov V. (supervised by Grakovsky A.)

Ilya Jackson defended the thesis "NEUROEVOLUTIONARY APPROACH TO METAMODELING AND OPTIMIZATION OF INVENTORY CONTROL SYSTEMS" at the public session of the Promotion Council of the Transport and Telecommunication Institute on May 19, 2020. Supervisor of doctoral thesis - Dr.habil.sc.ing. prof. Jurijs Tolujevs.

3.4. Scope of PostDoc program activities

In 2020 there were three ongoing post-doc projects (approved in 2017) with the budget total of 133805.88 euro for each of the projects, 5% of the financing coming from the Institute in form of salaries for consultants and infrastructure expenses.

This Postdoc projects are:
1) "Nontraditional regression models in transport modeling" (started 01.10.2017.)
The goal of the project is to develop nontraditional regression models, namely the Markov-modulated regression for analysis and forecasting of traffic flows and adjacent transport tasks in transport modelling and find algorithms for their parameter estimation for big data.

In 2020, **Dr. Nadežda Spiridovska** participated in following conferences:

- 6th Stochastic Modeling Techniques and Data Analysis International Conference with Demographics2020 Workshop Barcelona, Spain. (Tuesday 2 - Friday 5 June 2020)
- 20th International Multi-Conference Reliability and Statistics in Transportation and Communication (Relstat20) (Riga, Latvia).

2) "Spatiotemporal urban traffic modelling using big data" (started 01.10.2017.)
The goal the project is enhancing of the methodological base of urban traffic flow analysis with responsive multivariate spatiotemporal models and algorithms of their parameter estimation for big data.

In 2020, **Dr. Dmitrijs Pavļuks** participated in following conferences:

- 23rd Euro Working Group on Transportation Meeting (EGWT), 16-18 September 2020, (Paphos, Cyprus).
- IX International Research and Practice Conference "Mathematical and Computer Modelling in Economics, Insurance and Risk Management", November 25 – 28, 2020, (Russian Federation).
- 20th International Multi-Conference Reliability and Statistics in Transportation and Communication (Relstat20) (Riga, Latvia).

3) „Integrated Model for Energy Generation, Distribution and Management" (started 01.12.2017.)
The main goal of research is to develop country energy mixture model for clean environment and economy development in Latvia and implement a prototype of a novel routed smart grid for energy distribution and management.

In 2020, **Dr. Tatjana Endrjukaite** has made visiting research trip:
She has participated in following conferences:

- EJC 2020 - The 30th International Conference on Information Modeling and Knowledge Bases (Hamburg, Germany).
- 20th International Multi-Conference Reliability and Statistics in Transportation and Communication (Relstat20) (Riga, Latvia).

4. CONFERENCES AND OTHER SCIENTIFIC EVENTS

TSI continues to hold regularly local and international conferences. The most significant among them is the TSI's Annual International Conference "Reliability and Statistics in Transportation and Communication". In 2020 RelStat-20 Conference was held on 15-16 October 2020. The total number of participants in 2020 were 110 authors from 19 countries (Austria, Belarus, China, Czech Republic, Estonia, Finland, Georgia, Germany, Greece, Japan, Latvia, Lithuania, Poland, Portugal, Russia, Slovakia, Sweden, Ukraine, Spain) presented their research and shared the knowledges.
The Conference Proceedings of 2020 were published in Springer as well as Indexed in Web of Sciences.

Table 5

Scope of Conferences

CONFERENCES					
Conference	**Date**	**Total participants**	**Given Presentations**	**Total Authors**	**Countries**
Annual International Conference "Research and Technology – Step into the Future" (Spring)	24/04/2020	66	51	51	N/A (Local)
Annual International Conference "Research and Technology – Step into the Future" (Autumn)	04/12/2020	57	26	30	N/A (Local)
International Multidisciplinary Conference "Reliability and Statistics in Transportation and Communication (RelStat-2020)"	15/10/2020-16/10/2020	106	87	110	Austria, Belarus, China, Czech Republic, Estonia, Finland, Georgia, Germany, Greece, Japan, Latvia, Lithuania, Poland, Portugal, Russia, Slovakia, Sweden, Ukraine, Spain

Table 6

Scope of Workshops/Seminars and Guest Lectures

WORKSHOPS/SEMINARS/GUEST LECTURES	
Event	**Period**
An International Project Spread Your Wings/SYW	09/03/2020-10/03/2020
Riga Aviation Forum's Scientific Conference (RAF 2020)	09/09/2020 – 10/09/2020
Guest lecture **"Airport Operations"** was held in Transport and Telecommunication Institute by representatives of the Havas Latvia.	22/09/2020
Guest lecture **"Financial Security: Insurance"** by representatives of the Swedbank Latvia.	05/10/2020
Guest lecture **"Insights Into the Transport Industry"** was held in Transport and Telecommunication Institute by representatives of Kreiss, Venipak, Pasažieru Vilciens in frame of the Career Day.	20/10/2020
Online Guest lecture **"Kiberuzbrukumi transporta nozarē – no fantāzijas līdz realitātei"** was held in Transport and Telecommunication Institute by representatives of the Riga International Airport in frame of the Career Day.	20/10/2020
Guest lecture was held in Transport and Telecommunication Institute by representatives of the RETN Baltic in frame of the Career Day.	20/10/2020
Guest lecture **"Robots take the initiative"** was held in Transport and Telecommunication Institute by representatives of the ABB in frame of the Career Day.	20/10/2020
Guest lecture was held in Transport and Telecommunication Institute by representatives of the Scandiweb Latvia in frame of the Career Day.	20/10/2020
Guest lecture **"Microsoft Dynamics 365 - perspective direction"** was held in Transport and Telecommunication Institute by representatives of the Navisoft in frame of the Career Day.	20/10/2020
Guest lecture **"Modern container shipping industry"** was held in Transport and Telecommunication Institute by representatives of the MSC in frame of the Career Day.	20/10/2020
Guest lecture **"CLARITY & SAP"** was held in Transport and Telecommunication Institute by representatives of the Clarity in frame of the Career Day.	20/10/2020
Online Guest lectures **"All about transport logistics in Latvia"** was held in Transport and Telecommunication Institute by representatives of the Kreiss and Venipak in frame of the Career Day.	20/10/2020
Online Guest lecture was held in Transport and Telecommunication Institute by representatives of the UAV Factory in frame of the Career Day.	21/10/2020
Online Guest lectures **"How to live after graduation"** was held in Transport and Telecommunication Institute by representatives of the Delfi in frame of the Career Day.	22/10/2020
Guest lecture **"Discover test conditions even in worst requirements from Janis"** was held in Transport and Telecommunication Institute by representatives of the Accenture in frame of the Career Day.	22/10/2020

Online Guest lecture was held in Transport and Telecommunication Institute by representatives of the Conway Containers Solutions.	19/11/2020
Online Guest lecture **"Accenture Technology Vision"** was held in Transport and Telecommunication Institute by representatives of the Accenture.	19/11/2020
Online Guest lecture **"CLARITY & SAP. How to build your career in IT Consulting"** was held in Transport and Telecommunication Institute by representatives of the Clarity.	03/12/2020
Online Guest lecture was held in Transport and Telecommunication Institute by representatives of the Swedbank.	03/12/2020
Online discussion **"Aviation: new reality"** was held in Transport and Telecommunication Institute by representatives of Airport Riga, Latvian Aviation Association, Airline Support Baltic, International Airport Odesa and ВЦ-Пулково. Discussion topics: Airport operations; Requirements for training of aviation.	11/12/2020

Table 7

Scope of Courses

COURSES	
Event	**Period**
Course **"Airport Management"** for "Aviation Management", master students by Romano Pagliari from Air Transport in Cranfield University (UK).	31/01/2020 – 02/02/2020
Course **"Airport Management"** for "Aviation Management", master students by Romano Pagliari from Air Transport in Cranfield University (UK).	21/02/2020 – 23/02/2020
Course **"Algorithmic Means of Computer Graphics"** for master and PhD students by Aliaksandr Puptsau from European Humanities University (Lithuania).	21/02/2020 - 23/02/2020
Two study courses: **"Development in NET Environment" and "Logical Programming"** for bachelor students by Professor Ashish Seth from India Computer & Information Engineering in INHA University in Tashkent, (Uzbekistan).	25/02/2020 – 28/02/2020
Course **"Decision making methodologies"** for various students' groups in the study direction "Transport Services", as well as for students of the master programme "Aviation Management" by Eftihia Nathanail from University of Thessaly (Greece)	19/03/2020-20/03/2020
Course **"Algorithmic Means of Computer Graphics"** for master and PhD students by Aliaksandr Puptsau from European Humanities University (Lithuania).	26/03/2020-30/03/2020
Course **"Warehouse logistics"** for students of Faculty of Transport and Logistics by Berdymyrat Ovezmyradov from Turkmenistan and University of Tsukuba (Japan).	26/03/2020

Event	Period
Online lectures in the study course **"Transport Economics"** students of Master programme "Transport and Logistics" by Professor Harald Kitzmann from TTK University of Applied Science, Institute of Circular Economy and Technology in Tallinn, (Estonia).	24/04/2020-23/05/2020
Online lectures in the study course **"System Programming"** for various students' groups of the study programme "Computer Science" by Professor Vinod Kumar Verma from Sant Longowal Institute of Engineering & Technology in (India).	24/03/2020-9/04/2020
Course **"Theory of Heat Engines"** for TSI students by Rathan Babu Athota from Institute of Aeronautical Engineering (Hyderabad, Telangana, India).	October 2020
Courses **"Big Data Project: From Data to Product"** and **"Big Data Life Cycle"** for master and PhD students by Neil Rubens from Stanford University (USA) and University of Electro-Communications in Tokyo (Japan).	October 2020 – January 2021
Course **"Data Structures and Algorithms"** for TSI students by Dr Shahabboddin Shamshirband from Norwegian University of Science and Technology (Norway) and Ton Duc Thang University (TDTU), Vietnam.	October 2020 – January 2021
Courses **"WEB Development Tools" and "Cloud Computing"** for TSI students by Yasser Moustafa Kamal Abdelmonem Omar Youssef from Arab Academy of Science, Technology and Maritime Transport in (Egypt).	October 2020 – January 2021
Courses **"Management of Sustainable Supply Chains and Multimodal Transportation" and "Transport Systems"** for TSI students by Berdymyrat Ovezmyradov from Turkmenistan and University of Tsukuba (Japan).	October 2020 – January 2021

In compare with 2019, TSI has witnessed an increased participation at the international conferences, workshops and seminars/courses activities in TSI. The KPI above shows the TSI R&D sector progress in communication, cooperation, networking and knowledge sharing/transfer at the international level.

5. NATIONAL AND INTERNATIONAL COLLABORATION

Table 8

Scope of national and international collaboration

ORGANIZATION	COLLABORATION
National Research Organizations	**Type of collaboration / projects**
Institute of electronics and computer science	- Cooperation agreement
National Universities	**Type of collaboration / projects**
Riga Technical University	- Common Project Participation (EduRail); - Participation in Doctoral Review Committee - Joint Robotics Championship organisation
Rēzekne Academy of Technology	- Joint Robotics Championship organisation
University of Latvia	- Joint scientific articles - Participation in "RelStat 20'' Programme Committee
Vidzeme University of Applied Sciences (ViA)	- Participation in "RelStat 20'' Programme Committee - Collaboration Agreement in scientific and academic activities (Design of Doctoral program, researcher mobility, etc.)
Maritime Academy	- Collaboration Agreement in scientific and academic activities (Design of Doctoral program, researcher mobility, etc.)
BA School of Business and Finance	- Participation in "RelStat 20'' Programme Committee
Riga International School of Economics and Business Administration	- Participation in "RelStat 20'' Programme Committee
Latvian Agriculture University	- Collaboration Agreement in scientific and academic activities (Design of Doctoral program, researcher mobility, etc.)
"Accenture Latvia"	- Joint "Java" vocal training development - TSI "Career day" participation - Open lectures at TSI - Joint scientific seminars - Joint event management (e.g. "Action Days") - Student study visits to Accenture office
Local Enterprises	**Type of collaboration / B2B projects**
"X INFOTECH" Ltd	- Strategic partnership - Joint scientific work competition for TSI Students - Development of joint Laboratory IPB & ABC in TSI - Collaborative internship program - TSI "Career day" participation - Scholarships grants for TSI Students

	- Open lectures at TSI (IT, ICT topics) and student study visits to X Infotech office
C.T.Co	- Joint event management (guest lectures)
Deloitte Latvia	- Joint event management (Science-to-Business seminar)
RoboLogic	- Collaborative applied research
French Institute	- Research seminar
SIA "HBT"	- Cooperation agreement in frame of Investment and Development Agency of Latvia voucher programme
SIA "White Cardinals International"	- Cooperation agreement in frame of Investment and Development Agency of Latvia voucher programme

5.1. National Collaboration

The table below indicates the most significant activities in collaborations and cooperation with research and academic organizations, enterprises and companies, both at local and international levels. In compare with 2019 annual period, there were more collaborative activities with enterprises, as well as growth in numbers of joint projects and collaboration with research/academic organizations.

Scope of national and international collaboration

5.2. Scope of National Level Collaboration Projects

Table 9

Scope of National Level Collaboration Projects

Project	Type
Non-traditional regression models in transport modelling	National / Postdoc Latvia
Spatiotemporal urban traffic modelling using big data	National / Postdoc Latvia
Integrated Model for Energy Generation, Distribution and Management	National / Postdoc Latvia
Model of Smart Economy in a Smart City	National / Postdoc Latvia
Modernisation of Transport and Telecommunication institute STEM study programmes	National / Working Program 8.1.1.
FARO Lāzera Skenera Ārējās Panorāmas Kameras Izstrāde (Development of FARO Laser Scanner External Panoramic Camera) SIA "WHITE CARDINALS International"	Consulting project
Inovatīvas kases sistēmas demo iekārtas izstrāde (Creation of inovative cash register demo device) SIA „HBT"	Consulting project
Satiksmes plūsmas simulācija ap tirdzniecības centra "Akropole" teritoriju (Traffic flows simulation in the area of the multifunctional center "Akropole") M257 Ltd	Consulting project
Mobility study, traffic assessment and update of the "SUMBA" simulation model, Rīgas Domes Pilsētas attīstības departaments	Consulting project

5.3. International Level Collaboration Projects

Table 10

Scope of international collaboration in projects

ERASMUS+ KA2	
TYPE OF COLLABORATION	FIELD OF SCIENCE
Spread your wings (SYW)	Research / education
Digitally supported and virtual study practices for modern logistic systems. "DIGILOG"	Research / education
HORIZON 2020	
TYPE OF COLLABORATION	
Enhanced Physical Internet-Compatible Earth-friendly freight Transportation ansWer (ePIcenter)	Research / education
Workforce Europe – Transformation agenda for transport automation (We-Transform)	Research / education
INTERREG	
TYPE OF COLLABORATION	FIELD OF SCIENCE
Smart Logistics and Freight Villages Initiative (SmartLog)	Research
Intelligent Transport and Transport Management study module (INTELTRANS)	Research
COST	
TYPE OF COLLABORATION	FIELD OF SCIENCE
Wider Impacts and Scenario Evaluation of Autonomous and Connected Transport	Research / ICT
Project (15221) European Network for Research Evaluation in the Social Sciences and the Humanities (ENRESSH)	Social Sciences and Humanities
Project 15221 Advancing effective institutional models towards cohesive teaching, learning, research and writing development	Research / education
Project 19102 Language In The Human-Machine Era	Research / NLP
Project 18236 Multi-disciplinary innovation for social change (SHIINE)	Social sciences
ESF	
TYPE OF COLLABORATION	FIELD OF SCIENCE
Strengthening Transport and Telecommunication Institute Academic Staff in the Areas of Strategic Specialization (STTIAS)	Research / education

5.4. Most Important Foreign Collaborators

Table 11

Scope of important foreign collaboration

ORGANIZATION	TYPE OF COLLABORATION	COUNTRY
Academic organizations	**Cooperation**	
University of Deusto	- Scientific and academic activities (visits)	Spain
Ecole Nationale Superieure des Mines de Paris, ENSMP	- Scientific and academic activities (visits)	France
Grenoble Alpes University	- Scientific and academic activities (visits)	France
Technical University of Munich Department of Civil, Geo and Environmental Engineering	- Scientific and academic activities (visits)	Germany
Transport Policy at Delft University of Technology	- Scientific and academic activities (visits)	Netherlands
Inha University in Tashkent	- Collaboration in scientific and academic activities in European Social Fund project "Strengthening Transport and Telecommunication Institute Academic Staff in the Areas of Strategic Specialisation	Tashkent
Norwegian University of Science and Technology	- Collaboration in scientific and academic activities in European Social Fund project "Strengthening Transport and Telecommunication Institute Academic Staff in the Areas of Strategic Specialisation	Norway
European Humanities University	- Collaboration in scientific and academic activities in European Social Fund project "Strengthening Transport and Telecommunication Institute Academic Staff in the Areas of Strategic Specialisation	Lithuania
Exupery International School (EIS)	- Cooperation agreement in IT, telecommunication, robotics and aviation	Latvia
Arab Academy of Science, Technology and Maritime Transport	- Collaboration in scientific and academic activities in European Social Fund project "Strengthening Transport and Telecommunication Institute Academic Staff in the Areas of Strategic Specialisation	Egypt

Academic organizations	Cooperation	
Telecommunication Institute of Aveiro	- Collaboration in scientific and academic activities in European Social Fund project "Strengthening Transport and Telecommunication Institute Academic Staff in the Areas of Strategic Specialisation	Portugal
De Montfort University	- Collaboration in scientific and academic activities in European Social Fund project "Strengthening Transport and Telecommunication Institute Academic Staff in the Areas of Strategic Specialisation	United Kingdom
Tallinn University of Technology (TUT)	- Collaboration Agreement in scientific and academic activities - Joint Project collaboration (EDU-RAIL, SmartLog)	Estonia
University of Zilina	- Researcher and academic mobility	Slovakia
The University of Thessaly, Greece	- Collaboration Agreement in scientific and academic activities (Design of Doctoral program, researchers' mobility in EU Project Horison-2020, etc.) - Joint participation in H2020 Project Alliance - Double supervision for PhD student approbation - Joint Summer School in Riga for PhD and MS students - Finalizing Alliance Conference - Transport and Telecommunication Journal Board membership, reviewing	Greece
Regional Open Social Science University, Yoshkar-Ola	Organizing committee of the International scientific-practical conference	Russia
VSEI of Lublin	Researcher and academic mobility	Poland
University of the West of England ("UWE")	Academic cooperation and exchanges and the development of double degree programmes across a range of academic areas including Computer Science and Aviation.	United Kingdom
Vilnius Gediminas Technical University (VGTU)	Conference/Workshop Mutual Participation	Lithuania
Satakunta University of Applied Sciences (SAMK)	Cooperation agreement in the framework of the Erasmus+ programme	Finland
University POLITEHNICA of Bucharest	Knowledge Alliance in Air Transport Project	Romania
Margad University of Mongolia	Researcher and academic mobility	Mongolia

Academic organizations	**Cooperation**	
Samara State Technical University, Samara	Organizing committee of the International scientific-practical conference	Russia
Kyiv National Economic University named after Vadym Hetman; department of Strategic Management	Organizing committee of the International scientific practical conference	Ukraine
Research Institutes	**Cooperation**	
Fraunhofer-gesellschaft zur foerderung der angewandten forschung e.v.	- Collaboration in scientific and academic activities (Design of Doctoral program, researchers' mobility in EU Project Horizon2020, - Common participation in H2020 Project ("Alliance") - PhD workshop in Magdeburg, participation of students	Germany
Bulgarian Association for Management Development and Entrepreneurship	Research mobility	Bulgaria
Enterprises	**Cooperation**	
Training Center "Aviator"	Collaborative project	Russia

5.5. Important Scientific Cooperation Events

Course "Decision making methodologies" for master and PhD students by Eftihia Nathanail from University of Thessaly (Greece)

From 19 till 20 March 2020 Professor Eftihia Nathanail from University of Thessaly, (Greece) conducted a course "Decision making methodologies" for master and PHD students in Transport and Telecommunication institute (TSI).

Course topics:

- An Introduction to decision - making background, techniques, concerns
- Monetary-based techniques (cost-effectiveness and cost-benefit analyses)
- Multi-attribute Utility Theory (MAUT)
- Multi criteria analysis (Delphi, Analytical Hierarchy Process, normalization)
- Decision making in transportation systems (transportation and logistics projects – EVALOG)
- Outranking methods (Electre, Promethee)
- Multi objective mathematical programming (optimisation using Solver and Sitation)
- Technique for Order Preference by Similarity to Ideal Solution (TOPSIS)
- Monte Carlo Analysis
- Fuzzy Logic Method

5.6. Non-academic collaborations

Table 12

Non-academic collaboration

Name and Organisation	Type of collaboration	Country
Latvian Electrical Engineering and Electronics Industry Association (LETERA)	Membership, joint research	Latvia
International Airport "Riga"	Professional Master's in Aviation Management	Latvia
Latvian Information and Communications Technology Association (LIKTA)	Membership, joint research	Latvia
BITS (Baltic Information Technology Society)	Membership, joint promotion of research in STEM	Latvia
Informatics Europe	Membership, information exchange	Switzerland
European Conference of Transport Research Institutes (ECTRI)	Membership, information exchange, reviewing	EU
RAF-AVIA	Professional Master's in Aviation Management	Latvia
Association Latvijas Auto	Consultation	Latvia
Latvian Association of Remotely Piloted Aircraft Systems	Membership, Co-founder, Consultation, Projects.	Latvia
Latvian Aviation Association	Membership	Latvia
Scientific Training Consultation Center of Transport and Logistics (ZMKTLC)	Consultation	Latvia
Association of Paneuropa Coach Terminals	Member of Expert Board	Germany
Ltd. LEO Research Centre	Membership invited lectures, joint projects	Latvia
Ltd. "WING 4 SKY GROUP"	Professional Master's in Aviation Management	Latvia
ECTRI	Irina Jackiva is a Vice President of the association	Belgium
Ltd. "Airline Support Baltic"	Professional Master's in Aviation Management	Latvia

6. MEMBERSHIP IN EDITORIAL BOARDS (JOURNALS, CONFERENCES, ASSOCIATIONS)

TSI research and academic staff continue actively participation in the various scientific committees of conferences, as well as in editorial boards of scientific journals, which is very important for continuously growth of expertise area and advanced knowledge sharing.

Table 13

Memberships in Boards (Journals, Conferences, Associations)

Name	Journal
Igor Kabashkin	- Computer Modelling and New Technologies (ISSN 1407-5806), Latvia - Transport and Telecommunication (ISSN 1407-6160), Latvia - Journal of Air Transportation (ISSN 1093- 8826), USA, University of Nebraska at Omaha - Transport (ISSN 1392-1533), Lithuania, Lithuanian Academy of Science - Technological and Economic Development (ISSN 1392- 8619), Lithuania, Vilnius Gediminas Technical University - Aviation" (ISSN 1392-1534), Lithuania, Vilnius Gediminas Technical University - Journal "Transactions on Transport Sciences" (ISSN 1802-971X), Czech Republic, Ministry of Transport - Sustainable Spatial Development" (ISSN 1691-6174), Riga Technical University - Journal of Aviation Technology and Engineering" (ISSN 2159-6670), published by Purdue University Press, USA - Baltic Journal of Modern Computing (ISSN 2255-8950 electronic; ISSN 2255-8942 paperback), Estonia-Latvia-Lithuania
Irina Yatskiv	- Transport and Telecommunication (ISSN 1407-6160), Latvia - Mathematics in Engineering, Science and Aerospace (ISSN 2041-3165) - Maintenance and Reliability, Polish Maintenance Society (Warsaw) - Transport (ISSN 1392-1533), Lithuania, Lithuanian Academy of Science - Economics of Development, Kharkov National University of Economics - Sustainable Development of Transport and Logistics, Open Access Journal. ISSN 2520-2979
Alexander Grakovski	- Transport and Telecommunication (ISSN 1407-6160), Latvia
Jurijs Tolujevs	- Transport and Telecommunication (ISSN 1407-6160), Latvia
Alexander Andronov	- Automatic Control and Computer Sciences (ISSN 0146-4116), Latvia
Aleksander Stetjuha	- Economic Alternatives", ISSN 1312-7462 University of National and World Economy, Sofia, Bulgaria http://www.unwe.bg/eajournal/en
Irina Kuzmina-Merlino	- International Management Journals, United Kingdom, London. ISSN: 1742-528X (on-line Journals), IMJ Editorial Advisory Board http://www.managementjournals.com/editorialteam.htm - The Clute Institute, Journal of Business Case Studies, ISSN 1555-3353 (print); ISSN 2157-8826 (online) Reviewers' team http://journals.cluteonline.com/index.php/JBCS/about/displayMembership/39

	- Emerald Emerging Markets Case Studies Journal, Reviewer http://www.emeraldgrouppublishing.com/reviewers/index.htm - The University of World Economy, Editorial Board of University Yearbook (research papers), ISSN: 1312-5486 (print); ISSN (on-line) 2534-8949 http://yearbook.unwe.bg - Journal "Forum Scientiae Oeconomia" , Warsaw, Poland (ISSN 2300-5947 - printed, ISSN 2353-4435 - online), reviewer http://www.wsb.edu.pl/reviewers,m,f,2039
Aleksandr Medvedev	- Journal of Traffic and Transportation Engineering. David Publishing Company. New York, USA – editorial board member - Interstate aviation committee member of Coordinating Council
Georgs Utehins	- Lublin Higher School of Economics and Innovation (WSEI) – editorial board member
Kristine Užule	- Scientific Journal of the Siberian Federal University (Russia) "Gumanitarnije nauki", ISSN 2587-6066, http://journal.sfu-kras.ru/series/humanities/editorial-board
Boriss Misnevs	- International Journal on Information Technologies and Security Special Issue № SP1/2017 ISSN 1313-8251 Indexed in ESCI of Thomson Reuters, co-editor - Journal of Educational and Instructional Studies in the World – WJEIS – ISNN: 2146 – 7463. - http://www.wjeis.org/?pnum=6&pt=Editorial%20Board - International Women OnLine Journal on Distance Education - WOJDE, ISSN: 2147-0367) - http://www.wojde.org/?pnum=5&pt=Editorial%20Board

6.1. Memberships in Program and Organization Committee of Scientific Conferences

Table 14

TSI staff memberships in Programme and Organization Committees of scientific conferences

Name	Memberships
Igor Kabashkin	- Programme and Organization Committee of the International Conference “Reliability and Statistics in Transport and Communication”, (RelStat), Riga, Latvia - Programme Committee of the International Conference “European-Asian Transport Corridors: Trends. Strategies. Practices” - Transport Means 2018 - Programme and Organization Committee of the Conference “Research and Technology – step to the future, Riga, Latvia - Programme Committee of the Conference “Actual Problems of Education”, Riga, Latvia
Irina Yatskiv	- Programme and Organization Committee of the International Conference “Reliability and Statistics in Transport and Communication”, (RelStat), Riga, Latvia - Programme Committee of the International Conference on Dependability and Complex Systems (DepCoS-RELCOMEX), Wroslaw, Poland - Programme and Organization Committee of the Conference “Research and Technology – step to the future, Riga, Latvia. - Programme Committee of the Conference “Actual Problems of Education”, Riga, Latvia

Alexander Grakovski	- Programme Committee of the International Conference "Reliability and Statistics in Transport and Communication", (RelStat), Riga, Latvia - Programme and Organization Committee of the Conference "Research and Technology – step to the future, Riga, Latvia. - Programme Committee of the Conference "Actual Problems of Education", Riga, Latvia
Jurijs Tolujevs	- Programme and Organization Committee of the International Conference "Reliability and Statistics in Transport and Communication", (RelStat), Riga, Latvia.
Boriss Misnevs	- Programme and Organization Committee of the Conference "Research and Technology – step to the future, Riga, Latvia. - Programme Committee of the Conference "Actual Problems of Education", Riga, Latvia - International Congress on Education, Distance Education and Educational Technology- ICDET, Antalya- Turkiye
Irina Kuzmina-Merlino	- The Clute Institute, Journal of Business Case Studies, Reviewers' team. http://journals.cluteonline.com/index.php/JBCS/about/displayMembership/39 - The University of World Economy, Editorial Board of University Yearbook (research papers), ISSN: 1312-5486 (print); ISSN (on-line) 2534-8949 http://yearbook.unwe.bg - Yaroslavl State University named after Demidov, Journal "Social and Human Knowledge", ISSN 2412-6519http://www.uniyar.ac.ru/science/scientific-journals/series-the-humanities/editorial-staff/ - Journal "Forum Scientiae Oeconomia", Warsaw, Poland (ISSN 2300-5947 - printed, ISSN 2353-4435 - online), reviewer - Emerald's Emerging Markets Case Studies (EMCS). Editorial Advisory Board, Available at: http://www.emeraldgrouppublishing.com/products/case_studies/eab.htm. - Journal of Business Case Studies, The Clute Institute, Reviewers' team. http://journals.cluteonline.com/index.php/JBCS/about/displayMembership/39 - The University of World Economy, Editorial Board of University Yearbook (research papers), ISSN: 1312-5486 (print); ISSN (on-line) 2534-8949 http://yearbook.unwe.bg - Journal "Social and Human Knowledge", Yaroslavl State University named after Demidov, ISSN 2412-6519 http://www.uniyar.ac.ru/science/scientific-journals/series-the-humanities/editorial-staff/ - International Strategic Management Conference, Prague July 12-14, 2018 Peer-Review Committee.
Aleksandr Medvedev	- Programme Committee of the Conference "Research and technology – step into the future", TSI Research and academic conference. - Inter- higher school scientific and educational conference "Actual problems of education" (TTI) – programme committee member
Georgs Utehins	- Programme and Organization Committee of the Conference "Research and Technology – step to the future, Riga, Latvia - Programme Committee of the Conference "Actual Problems of Education", Riga, Latvia

	- Lublin Higher School of Economics and Innovation (WSEI) – editorial board member, "Transportation systems and Information Technology"
Mihails Savrasovs	- Programme and Organization Committee of the International Conference "Reliability and Statistics in Transport and Communication", (RelStat), Riga, Latvia - Scientific Committee of the International Conference on Sustainable Urban Mobility, Volos, Greece
Dmitry Pavlyuk	- Programme and Organization Committee of the International Conference "Reliability and Statistics in Transport and Communication", (RelStat), Riga, Latvia
Ishgaley Ishmuhametov	- Member of the Programme Committee of the Conference "Actual Problems of Education", Riga, Latvia - Member of the Programme and Organization Committee of the Conference "Research and Technology – step to the future, Riga, Latvia - Member of the Programme Committee of the International Conference "Reliability and Statistics in Transport and Communication", (RelStat), Riga, Latvia - Member of the Programme Committee of the International Scientific and Practical Conference "Psychological Support of Education: the theory and practice". (Joint Conference with the TSI). Yoshkar-Ola: MOSI, Russia. - Member of the Programme Committee of the International Scientific and Practical Conference " Innovative Strategies for the Development of Economics and Management" (Joint Conference with the TSI). Samara State Technical University, Samara, Russia
Anna Palma	- Member of the Programme Committee of the Conference "Actual Problems of Education", Riga, Latvia - Member of the Organization Committee of the Conference "Research and Technology – step to the future, Riga, Latvia - Heritage & Tourist Destinations: Creative Approaches in Development - The International Scientific Conference Tourism and Innovations, University of Economics, Varna, Bulgaria. Peer reviewer
Jeļena Popova	- International Scientific and Practical Conference Cultural Heritage & Tourist Destinations: Creative Approaches in Development - The International Scientific Conference Tourism and Innovations, University of Economics, Varna, Bulgaria. Peer reviewer
Aleksandrs Stetjuha	- Member of the Programme Committee of the Conference "Actual Problems of Education", Riga, Latvia - Member of the Programme and Organization Committee of the Conference "Research and Technology – step to the future, Riga, Latvia - Member of the International Advisory Board of the Journal "Economic Alternatives", University of National and World Economy, Sofia, ISSN 1312-7462
Julia Stukalina	- Member of the Programme Committee of the Conference "Actual Problems of Education - MIP2018", Riga, Latvia - Member of the Programme Committee of the International Conference "Reliability and Statistics in Transport and Communication", (RelStat), Riga, Latvia

6.2. Prizes Awarded to Researchers, Honours and Scientific Positions of Trust

The Best Papers of the TSI RelStat-2020 Conference

This year, the 20th International Multidisciplinary Conference "Reliability and Statistics in Transportation and Communication" (RelStat-20) was held remotely, but despite this, all the participants performed and, on many works active discussions flared up.

In this anniversary year, the conference organizing committee also **held two competitions.**

1) **Competition for Best Paper by Young Researchers**

We are glad to announce that the winners of this competition are:

- *"Virtual Campus Journey: Personalization versus Customization", Bakhtiyor Esanov (Lappeenranta-Lahti University of Technology, Finland).*
- *"Neuroevolutionary Approach to Metamodel Based Optimization in Production and Logistics", Ilya Jackson (Transport and Telecommunication Institute, Latvia).*

Winners receive a 100% discount on participation fee in the next RelStat conference.

2) **Competition of Best Paper**

The winners were a group of authors representing the Fraunhofer Institute for Factory Operation and Automation IFF (Germany):

- *Martin Hünermund, Maik Groneberg and Artur Schütz, for their article "Fast connected components object segmentation on fused lidar and stereo-camera point clouds with visual-inertial-gimbal for mobile applications utilizing GPU acceleration".*

The winners, in addition to the Diploma, receive the opportunity to participate in the next conference with a 50% discount on participation fee.

The Best among Private Research Institutes in the International Evaluation of Latvian Scientific Institutions

The latest International Evaluation of Latvian Scientific Institutions, commissioned by the Ministry of Education and Science (MES) and carried out by foreign experts involved by Tehnopolis, shows significant progress compared to the previous period (until 2013) in the country as a whole.

All institutes were divided into 6 areas: natural sciences; medicine and health care; agriculture, forestry and veterinary medicine; social sciences; humanities and arts; engineering and technology.

Scientific institutions were assessed on a five-point scale on six criteria, such as research quality, impact on society and the economy, environment and infrastructure, and development potential.

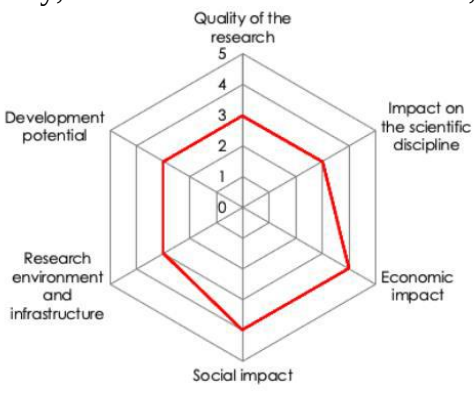


Figure 15 Quality of the research

The Transport and Telecommunication Institute (TSI) received grades 3 and 4. This means a good level, an important national player with significant international cooperation. Important note, grade 4 in the sections: impact on society and economy, which is significant for any scientific institution.

TSI has entered the QS EECA University Rankings

The Transport and Telecommunication Institute (TSI) is the only private higher education institution from Latvia which was included in the ranking list of the international QS University Rankings in Emerging Europe & Central Asia (EECA). TSI also in previous years was entered this ranking and this year it took 351-400 place. The leader of the ranking is the Lomonosov Moscow State University. QS EECA University Rankings is one of the most important university rankings in the world. Higher education institutions are evaluated by their reputation in the world, evaluation from employers, citations and number of publications, number of lecturers and students, ratio for academic staff with PhD and other criteria.

6.3. Memberships in committees and in scientific advisory boards of business companies or other similar tasks of no primarily academic nature

One of the most important outcomes and goals for TSI Research & Development program is support and knowledge sharing for business. R2B connections and communications is supported by participation of TSI Research/Academic Staff in business company's scientific advisory boards.

Table 15

TSI Staff membership in scientific advisory boards of business companies and associations

Name	Tasks
Igor Kabashkin	Scientific supervisor of Latvian Centre of Competence in Transport, Energy and Manufacturing
Irina Yatskiv	External expert in Association of Paneuropian Coach Terminals Member of Board, ECTRI
Alexander Grakovski	Member of Council of expert working group of the electronic communications sector (Latvian Ministry of Transport)
Aleksandr Medvedev	Telemātikas un loģistikas institūts Ltd. – board member Aviation Research Center Ltd. – board member Member of Latvian professorial association of higher schools
Ieva Kozlovska	Member of examination commission of the Latvian Association of Sworn Auditors

7. SUBMITTED PROJECT APPLICATIONS

Table 16

Submitted Project Applications (2020)

No	Application	Type of project/programme
1	Fundamentals of Design Competence for Our Digital Future (D-CODE)	Horizon2020
2	Integrated Radar and communication technology for Future wireless system (INTERACT)	Horizon2020
3	"Towards a Roadmap for multimodAl mobility with coNnected and automated vehicles: SImulation and optimizaTION (TRANSITION)"	Horizon2020
4	DEE-Prize-2020_ALLIANCE	Horizon2020
5	WORKFORCE EUROPE - TRANSFORMATION AGENDA FOR TRANSPORT AUTOMATION (WE - TRANSFORM)	Horizon2020
6	ADVanced research methods and tools for the Integrated and Cooperative Ecosystem of the mobility of tomorrow (ADVICE)	Horizon2020
7	Coordination and support for an integrated freight transport and logistics system (COLOGIST)	Horizon2020
8	Intelligent Transport and Transport Management study module (INTELTRANS)	Interreg Central Baltic
9	CzechWay	H2020-FETOPEN
10	Enhancing Functionalities of Visabit Platform (VISABIT2020)	Horizon2020 in frame of the programme Enhanced European Innovation Council (EIC) pilot
11	Entrepreneurial University for European Union (EUforEU)	Erasmus+ Key Action 2
12	VR based learning system for professional development and social adaptation on cobotics / VRCOBO	Erasmus+ Key Action 2
13	ERASMUS Mobility-as-a-Service under COVID-19 (EMaaS-19)	Erasmus+ Key Action 2
14	European Framework and Platform for Support of the Academic Co-operation (EUNIFORM)	Erasmus+ Key Action 2
15	ASECRIT, Accesibility, Digital SEcurity and CRItical Thinking	Erasmus+ Key Action 2
16	IoTA: Internet of Things to/for All	Erasmus+ Key Action 2
17	CRIDASEC - CRitical thinking with DAta literacy, Accessibility and SECurity	Erasmus+ Key Action 2
18	Health assessment of tree trunk by using methods of radar subsurface sounding (TreeRadar)	LZP, fundamentālo un lietišķo pētījumu projekts

19	The Energy Food Transportation Nexus as a Solution in the Urban Environment (ENDURE)	Baltic-Nordic Energy Research Programme, Nordic Energy Research
20	Development of an intelligent UAS location system based on the optical image of the terrain received in flight	Latvia - Belarus Cooperation Program in Science and Technology
21	Development of information support system for life cycle cost of small, unmanned aviation complexes	Latvia - Belarus Cooperation Program in Science and Technology
22	Potential of enhanced floating car data for spatiotemporal urban traffic forecasting	LZP
23	ENERGYNET: Integrated model for smart energy generation, distribution, and management	LZP
24	Digital Twin as a Testbed Environment for Intelligent Airport Ground Traffic Control Systems	LZP
25	Development of FARO Laser Scanner External Panoramic Camera	Voucher programme (LIAA)

8. FINANCING OF RESEARCH

Table 17

2020 TSI R&D Budget

Financing	Amount EUR without VAT (21%)
Financing for the research	**1 048 400**
National budget financing	366 277
Revenues from contract work with another Latvian legal entities	36 226
Foreign financing (financing received from international organizations or international organizations contract basis, payments received from abroad on research activities)	559 567
Other funding for scientific work together: References from conferences, seminars, etc.	86 330

ANNEX 1

1. Lists of most important publications by academic personnel and researchers with doctoral degree

1. **Pavlyuk, D.** (2020) Transfer learning: Video prediction and spatiotemporal urban traffic forecasting. Algorithms, 13 (2), art. no. 39,
2. **Pavlyuk, D.** (2020) Make It Flat: Multidimensional Scaling of Citywide Traffic Data. Lecture Notes in Networks and Systems, 117, pp. 80-89
3. **Zervina, O.** (2020) The Analysis of Threat Defining Language in the EU Official Transport Security and Safety Documents. Lecture Notes in Networks and Systems, 117, pp. 329-338
4. **Popova, Y.,** Petrov, I. (2020) Impact of the Human Capital Factors on the Country Competitiveness. Lecture Notes in Networks and Systems, 117, pp. 662-671
5. **Krivchenkov, A., Grakovski, A., Balmages, I.** (2020) Feasibility Study on the Use of Energy Storage Systems to Reduce the Enterprise Energy Consumption Costs. Lecture Notes in Networks and Systems, 117, pp. 500-510
6. **Ishmuhametovs, I., Kuzmenko, L., Palma, A**. (2020) Conditions for Foreign Students' Adaptation and Its Characteristic Features in the Higher Education Institution in Latvia. Lecture Notes in Networks and Systems, 117, pp. 694-704
7. **Pozdnyakova, O., Pozdnyakov, A.** (2020) Distance Learning as an Option to Overcome the Learning Barriers of Adult Female Students. Lecture Notes in Networks and Systems, 117, pp.705-713
8. **Grakovski, A., Yunusov, S., Medvedev, A.** (2020) Static Approach for Solving the Problem of Cargo Weight Distribution on Vehicle's Axles. Lecture Notes in Networks and Systems, 117, pp.151-161
9. **Saifutdinov, F., Tolujevs, J.** (2020) Analysis of Navigation Systems for Landside Transport Processes Control. Lecture Notes in Networks and Systems, 117, pp.552-561
10. **Spiridovska, N.** (2020) Markov-Modulated Processes, Their Applications and Big Data Cases: State of the Art . Lecture Notes in Networks and Systems, 117, pp.100-109
11. **Jackson, I.** (2020) Neuroevolutionary Approach to Metamodeling of Production-Inventory Systems with Lost-Sales and Markovian Demand. Lecture Notes in Networks and Systems, 117, pp.90-99
12. **Jackson, I., Grakovski, A.** (2020) Combining LSTM Artificial Recurrent Neural Networks and Fractal Analysis for Inventory Dynamics Prediction. Lecture Notes in Networks and Systems, 117, pp.25-33
13. Vasiļevska, D., **Sproģe, I.** (2020) E-commerce Market in the Baltic Countries: State-of-the-Art and Trends of Development. Lecture Notes in Networks and Systems, 117, pp.620-629
14. **Kuzmina-Merlino, I.**, Saksonova, S., Djakonova, K (2020) Airport Charges Policy as a Tool for Achieving Competitive Advantage in the Aviation Market. Lecture Notes in Networks and Systems, 117, pp.549-551
15. **Pivovar, M., Misnevs, B., Pticina, I.** (2020) Methodology for Calculating ETL Indicators in the Process of Implementation of Aircraft Maintenance Information Systems. Lecture Notes in Networks and Systems, 117, pp.44-53
16. Jēkabsone, S., Skribāne, I., Kristone, S., **Sproģe, I.** (2020) Investment Policy Development and Problems in Latvia. Lecture Notes in Networks and Systems, 117, pp.611-619

17. Skačkauskas, P., **Grakovski, A**., Mejeras, G (2020) The Analysis of the Stanley's Controller Performance in the Presence of the Steering Angle Disturbances. Lecture Notes in Networks and Systems, 117, pp.583-592
18. **Fedorov, R., Pavlyuk, D.** (2020) Economic Efficiency of Data-Driven Fault Diagnosis and Prognosis Techniques in Maintenance and Repair Organizations. Lecture Notes in Networks and Systems, 117, pp.34-43
19. Dolle, N., **Kuzmina-Merlino, I.** (2020) Benchmarking of Corporate Communication Measurement Strategies in Major Enterprises Based on the Value-Benefit Analysis. Lecture Notes in Networks and Systems, 117, pp.630-640
20. **Larin, D., Tolujevs, J.** (2020) Defining the Proper Model for Aviation Spare Parts Forecast. Lecture Notes in Networks and Systems, 117, pp.71-79
21. **Zvaigzne, A.,** Bondarenko, O. (2020) Efficiency Analysis of a Small Universal Platform Type SWATH. Lecture Notes in Networks and Systems, 117, pp.176-186
22. **Andronov, A.,** Dalinger, I (2020) Analysis of Flow of Complex Messages Formed by Two Poisson Flows of Elementary Messages. Lecture Notes in Networks and Systems, 117, pp.110-118
23. Kamolins, E., Gorobetz, M., **Malnaca, K.,** Korneyev, A (2020) Analysis of Test Results for Developed Technology of Diesel Bus Conversion into Electric Bus. Lecture Notes in Networks and Systems, 117, pp.374-384
24. Rozgina, L., Saksonova, S., **Kuzmina-Merlino, I**. (2020) Concentration Dynamics in the Market for Audit of Public Interest Entities in Latvia. Lecture Notes in Networks and Systems, 117, pp.374-384
25. Veido, D., **Misnevs, B.,** Plotkin, A. (2020) The Method of Agile Projects Success Evaluation Using Machine Learning. Lecture Notes in Networks and Systems, 117, pp.478-487
26. **Tyncherov, T., Rozkova, L** (2020) Aircraft Lifecycle Digital Twin for Defects Prediction Accuracy Improvement. Lecture Notes in Networks and Systems, 117, pp.54-63
27. **Endrjukaite, T., Dudko, A.**, Roose, L.R., Davies, K (2020) Routed Energy Distribution Network Concept with Electrical Energy Router. Lecture Notes in Networks and Systems, 117, pp.5110520
28. Kazakova, N.A., Sivkova, A.E., Kogdenko, V.G., **Kuzmina-Merlino, I** (2020) Assessment and forecasting of economic sustainabili-ty of russian metallurgical companies. Chernye Metally, 2020 (4), pp. 56-64.
29. **Uzule, K.** (2020) Teacher training and education programs in latvia: Are e-competences included? Business Management and Education, 18 (2), pp. 294-306.
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34. **Andronov, A.M.,** Dalinger, I.M. (2020) Poisson Flows with Alternating Intensity and Their Application. Automatic Control and Computer Sciences 54(5), pp. 403-411
35. **Pavlyuk, D.** (2020) Temporal Aggregation Effects in Spatiotemporal Traffic Modelling. Sensors 2020, 20(23), 6931; https://doi.org/10.3390/s20236931 (open access article)
36. **Dudko, A., Endrjukaite, T.,** Roose, L. (2020) Open routed energy distribution network simulation for maui village case study. Frontiers in Artificial Intelligence and Applications 333, pp. 45-55
37. Nathanail, E., Adamos, G., Mitropoulos, L., Karakikes, I., **Yatskiv, I.** (2020) How efficiently educational programs prepare professionals to meet current and future challenges of transport interchanges. European Transport - Trasporti Europei 79
38. **Popova, Y.** (2020) Economic or financial substantiation for smart city solutions: A literature study. Economic Annals-XXI 183(5-6), pp. 125-133
39. Dolzhenko, N., Mailyanova, E., **Toluev, Y.,** Assilbekova, I. (2020) Influence of system errors in meteorological support on flights safety. News of the National Academy of Sciences of the Republic of Kazakhstan, Series of Geology and Technical Sciences 5(443), pp. 1-89
40. **Kabashkin, I.,** Philippov, V. (2020) Availability of emergency power supply for voice communications of air traffic control system. Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics) 12525 LNCS, pp. 155-164
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44. **Holavin, A. O**. (2020) SOCIAL INACTION AT EARLY STAGES OF THE COVID-19 PANDEMICS. SOTSIOLOGICHESKIE ISSLEDOVANIYA Issue: 11 Pages: 139-148
45. **Pavlyuk, D., Spiridovska, N., Yatskiv (Jackiva), I.** (2020) SPATIOTEMPORAL DYNAMICS OF PUBLIC TRANSPORT DEMAND: A CASE STUDY OF RIGA. TRANSPORT Volume: 35 Issue: 6 Pages: 576-587

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2. **Kabashkin, I.** (2020) Dependability of Multichannel Communication System with Maintenance Operations for Air Traffic Management . Advances in Intelligent Systems and Computing, 987, pp. 256-263.
3. **Zervina, O.** (2020) A linguistic analysis of startups in the context of the air transport industry management. CEUR Workshop Proceedings, 2620, pp. 57-64.
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6. Roskosa, A., **Stukalina, Y.** (2020) Investigating Students' Perceptions of their University's Brand. RURAL ENVIRONMENT, EDUCATION, PERSONALITY. (REEP) Rural Environment Education Personality, 13 pp.366-376
7. **Smagina, A.,** Ludviga, I. (2020) Craft Entrepreneurship and Created Value. RURAL ENVIRONMENT, EDUCATION, PERSONALITY. (REEP) Rural Environment Education Personality, 13 pp.366-376
8. **Savrasovs, M.** (2020) Evaluation of Shopping Mall Implementation Impact on Safety Aspect of the Transport Network Based on Simulation: Case-Study of Riga. VISION ZERO FOR SUSTAINABLE ROAD SAFETY IN BALTIC SEA REGION. Lecture Notes in Intelligent Transportation and Infrastructure, pp. 195-205
9. **Saifutdinov, F., Tolujevs, J.** (2020) A model for ground transportation systems simulation at airports under centralized control. Proceedings - European Council for Modelling and Simulation, ECMS
10. **Saifutdinov, F., Jackson, I., Tolujevs, J.,** Zmanovska, T. (2020) Digital Twin as a Decision Support Tool for Airport Traffic Control. 2020 61st International Scientific Conference on Information Technology and Management Science of Riga Technical University, ITMS 2020 - Proceedings, 2020, 9259294
11. **Jackiva, I., Budiloviča, E.** (2020) Decision-Support Framework for the Urban Public Transport System Sustainable Planning: Riga Case Study. TRANSBALTICA XI: Transportation Science and Technology. TRANSBALTICA 2019. Lecture Notes in Intelligent Transportation and Infrastructure. Springer, Cham, pp. 552-561
12. **Jackiva, I., Gromule, V.** (2020) Riga International Coach Terminal: Safety and Security Risk-Based Decision-Making Approach. TRANSBALTICA XI: Transportation Science and Technology. TRANSBALTICA 2019. Lecture Notes in Intelligent Transportation and Infrastructure. Springer, Cham, pp. 511-520
13. **Kabashkin, I.**, Philippov, V. (2020) Fault tolerance of multi-channel radio network with dynamic spectrum access strategy in air traffic management systems. 2020 International Symposium on Networks, Computers and Communications, ISNCC 2020 9297184

a. Textbooks and other research-related publications

- **Y. Stukalina,** M. Byczkowska, Z. Poplavska, S. Komarynets, A. Majzel and K. Zieba. Entrepreneurship Today: Selected Aspects, Gdansk University of Technology Publishing House, 2020.

b. Conference abstracts

1. **A. Pozdnyakov** and **O. Pozdnyakova**. "Telepresence Robot as the Teacher's Assistant in a Pandemic Conditions". *Abstracts of the 20th International Multi-Conference "RELIABILITY and STATISTICS in TRANSPORTATION and COMMUNICATION" (RelStat'20),14–17 October 2020. Riga, Latvia*. I. Kabashkin and I. Yatskiv eds. 2020. pp. 146.
2. **I. Ishmuhametov** and **L. Kuzmenko**. "The Study of Students' Opinion on Learning online in the Self-Isolation Period". *Abstracts of the 20th International Multi-Conference "RELIABILITY and STATISTICS in TRANSPORTATION and COMMUNICATION" (RelStat'20),14–17 October 2020. Riga, Latvia*. I. Kabashkin and I. Yatskiv eds. 2020. pp. 142.

3. N. Dolle, M. Rössle, **I. Kabashkin** and H. Kitzmann. "IT-Platform for Algorithm-Based Automation of Academic Study Programme Development". *Abstracts of the 20th International Multi-Conference "RELIABILITY and STATISTICS in TRANSPORTATION and COMMUNICATION" (RelStat'20),14–17 October 2020. Riga, Latvia*. I. Kabashkin and I. Yatskiv eds. 2020. pp. 141.
4. H. Kitzmann, **I. Kabashkin**, M. Rössle and N. Dolle. "Supply Chain Management and Logistic Development in International Context: Challenge for CrossNational Education". *Abstracts of the 20th International Multi-Conference "RELIABILITY and STATISTICS in TRANSPORTATION and COMMUNICATION" (RelStat'20),14–17 October 2020. Riga, Latvia*. I. Kabashkin and I. Yatskiv eds. 2020. pp. 136.
5. **Y. Stukalina**. "Towards Innovative Education: Developing Digital Learning Strategy in a Modern University". *Abstracts of the 20th International Multi-Conference "RELIABILITY and STATISTICS in TRANSPORTATION and COMMUNICATION" (RelStat'20),14–17 October 2020. Riga, Latvia*. I. Kabashkin and I. Yatskiv eds. 2020. pp. 133.
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7. **J. Popova**. "Do the Researchers Have Any Economic or Financial Substantiation for Smart City: Literature Review". *Abstracts of the 20th International Multi-Conference "RELIABILITY and STATISTICS in TRANSPORTATION and COMMUNICATION" (RelStat'20),14–17 October 2020. Riga, Latvia*. I. Kabashkin and I. Yatskiv eds. 2020. pp. 107.
8. **K. Užule**, **I. Kuzmina-Merlino** and M. Merlino. "Modern Managers in Gig Economies: Competencies, Personality and their Effect on Manager Education in the Digital Era". *Abstracts of the 20th International Multi-Conference "RELIABILITY and STATISTICS in TRANSPORTATION and COMMUNICATION" (RelStat'20),14–17 October 2020. Riga, Latvia*. I. Kabashkin and I. Yatskiv eds. 2020. pp. 102.
9. A. Dinko, **I. Yatskiv** and E. Budilovich. "Sustainable Trip Planner Concept Development". *Abstracts of the 20th International Multi-Conference "RELIABILITY and STATISTICS in TRANSPORTATION and COMMUNICATION" (RelStat'20),14–17 October 2020. Riga, Latvia*. I. Kabashkin and I. Yatskiv eds. 2020. pp. 78.
10. **A. Grakovski** and **A. Krivchenkov**. "Evaluation of Efficiency of the Energy Storage Systems (ESS) in Problem of Reducing the Energy Consumption Costs in Long-Term Planning". *Abstracts of the 20th International Multi-Conference "RELIABILITY and STATISTICS in TRANSPORTATION and COMMUNICATION" (RelStat'20),14–17 October 2020. Riga, Latvia*. I. Kabashkin and I. Yatskiv eds. 2020. pp. 76.
11. P. Skačkauskas and **A. Grakovski**. "Efficiency Analysis of Stanley's Controller Applied to the Autonomous Ground Vehicle Movement Control Under Effect of Various Perturbations". *Abstracts of the 20th International Multi-Conference "RELIABILITY and STATISTICS in TRANSPORTATION and COMMUNICATION" (RelStat'20),14–17 October 2020. Riga, Latvia*. I. Kabashkin and I. Yatskiv eds. 2020. pp. 68.
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13. B. Ovezmyradov and **G. Gromov**. "Comparison of Spreadsheets and Computing Languages in Simulation of Stochastic Inventory Models". *Abstracts of the 20th International Multi-Conference "RELIABILITY and STATISTICS in TRANSPORTATION and COMMUNICATION" (RelStat'20),14–17 October 2020. Riga, Latvia*. I. Kabashkin and I. Yatskiv eds. 2020. pp. 49.
14. F. Saifutdinov, **I. Jackson** and **J. Tolujew**. "Scenario Modeling in a Centralized Airport Ground Traffic Control System". *Abstracts of the 20th International Multi-Conference "RELIABILITY and STATISTICS in TRANSPORTATION and COMMUNICATION" (RelStat'20),14–17 October 2020. Riga, Latvia*. I. Kabashkin and I. Yatskiv eds. 2020.
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17. **O. Zervina**, **Y. Stukalina**, **D. Pavlyuk** and N. Rubens. "Value Creation in Air Transportation: Beyond Price, Quality and Speed". *Abstracts of the 20th International Multi-Conference "RELIABILITY and STATISTICS in TRANSPORTATION and COMMUNICATION" (RelStat'20),14–17 October 2020. Riga, Latvia*. I. Kabashkin and I. Yatskiv eds. 2020. pp. 18.
18. **I. Jackson**. "Neuroevolutionary Approach to Metamodel-based Optimization in Production and Logistics". *Abstracts of the 20th International Multi-Conference "RELIABILITY and STATISTICS in TRANSPORTATION and COMMUNICATION" (RelStat'20),14–17 October 2020. Riga, Latvia*. I. Kabashkin and I. Yatskiv eds. 2020. pp. 12.
19. **D. Pavlyuk**. "Spatiotemporal Forecasting of Urban Traffic Flow Volatility". *Abstracts of the 20th International Multi-Conference "RELIABILITY and STATISTICS in TRANSPORTATION and COMMUNICATION" (RelStat'20),14–17 October 2020. Riga, Latvia*. I. Kabashkin and I. Yatskiv eds. 2020. pp. 10.
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23. Monta Aleksandra Lacane. "Inbound and Outbound Air Traffic of Riga International Airport Analysis Over a Waypoint LAPSA". *Abstracts of the 20th International Multi-Conference "RELIABILITY and STATISTICS in TRANSPORTATION and COMMUNICATION" (RelStat'20),14–17 October 2020. Riga, Latvia*. I. Kabashkin and I. Yatskiv eds. 2020. pp. 26.
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26. **Tatiana Endrjukaite** and Alexander Dudko. "Energy Polisy and Economy Based on Smart Grid Routing Protocols and Energy Trading". *Abstracts of the 20th International Multi-Conference "RELIABILITY and STATISTICS in TRANSPORTATION and COMMUNICATION" (RelStat'20),14–17 October 2020. Riga, Latvia*. I. Kabashkin and I. Yatskiv eds. 2020. pp. 73.
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