

TRANSPORT AND TELECOMMUNICATION INSTITUTE

DOCTORAL STUDY PROGRAM “DIGITAL ECONOMY AND BUSINESS”

description

Riga, 2023




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I. INFORMATION ON THE FIELD OF STUDY

1. The aims and objectives of the field of the study

The doctoral study programme "Digital Economy and Entrepreneurship" is a part of the accredited study direction "Management, Administration and Real Estate Management".

The aim and objectives of the study direction "Management, Administration and Real Estate Management" are developed in accordance with the scope of the activity of TTI, directions of strategic specialization, development needs and trends of the society and economy, as defined by the ["TTI Development Strategy 2020-2025"](#). The TTI strategy defines five directions for the strategic development of TTI: international engagement involvement; education: teaching and learning; research and knowledge transfer; business and community engagement; and human resources, with the objectives to be achieved in each direction.

The goals and objectives of the TTI Strategy and Study direction are based on such external documents as "Sustainable Development Strategy of Latvia until 2030", which stipulates that the main focus of business development strategies should be on the development of human capital and the transition to higher qualification skills. Latvia needs to build an open innovation system that promotes the rapid diffusion of knowledge and reduces the various barriers to knowledge acquisition. Latvian universities and research institutions need to become more open and promote the spread of knowledge both in the academic environment and within the business sector, as well as internationally – nationally, in the Baltic Sea region, in Europe, and globally. "The Latvian National Development Plan 2021 - 2027" (approved by the Saima on July 2, 2020), which includes such directions of action as the excellence of science for the development of society, the growth and security of the national economy, and productivity and innovation, promoting the development in the areas of smart specialization. "Guidelines for Science, Technological Development and Innovation 2014 - 2020", and "Guidelines for Science, Technological Development and Innovation 2021 - 2027" (Order of Cabinet of Ministries No. 246.) envisage building the knowledge base and creating new knowledge for ensuring quality and research-based education, promoting research excellence, as well as developing new technologies for creating innovative products and services.

The TTI's operational strategy follows these principles set out in the national strategic documents. The study programme sets include a comprehensive range of courses in business and management studies as well as economic study courses. This is very important, since students are being prepared to work in the company operating in any economic sector whose activities are related to the fields of business and management, and therefore the students need to understand a wide range of issues related to the overall development of the economy, as well as being able to perform the specific calculations and make effective management decisions.

The aim of the study direction is to provide students with a sustainable high - quality education in the field of management studies, ensuring the development of competitive careers in the Latvian and international labour market and preparing internationally recognised, highly qualified specialists meeting the requirements of the modern employers' market in various fields of management and administration, using the results of research in the relevant scientific fields.

The objectives of the study field are as follows:

1. to create, maintain and develop a multi-level, sustainable education supported by the research and collaboration with business professionals.
2. to provide a study process that meets the requirements of legislative acts and the labour market as well as a student - centred approach to higher education.

3. to ensure the qualifications of the teaching and research staff in the pedagogical and scientific field.
4. to provide and develop the infrastructure and material and technical base in accordance with the needs of implementation of the study programme.
5. to develop international cooperation with the related higher education institutions, enterprises and organisations.
6. to provide students with transversal or transversal skills.

2. Study programmes included in the field of the study

Study programmes implementation in the field of study "Management, Administration and Real Estate Management" corresponds to the thematic area of the Latvian Classification of Education "*Commercial Sciences and Administration*".

The study field "Management, Administration and Real Estate Management" accredited by the Institute of Transport and Telecommunications provides the right to implement one basic study programme, one academic Master study programme, one professional Master study programme and one Doctoral study programme:

- Bachelor programme "Business and Management", education classification code 43345, licensed on October 13, 1999;
- Master degree programme in "Entrepreneurship and Management", education classification code 45345, licensed on October 13, 1999;
- Professional Master programme "Aviation Management", education classification code 47345, licensed on October 25, 2017;
- Doctoral programme "Digital Economy and Entrepreneurship", education classification code 51345, licensed by the Decision of the Study Quality Commission of October 13, 2021, licence No. 04038-25.

Studies in the field of study of TTI cover a full three-level study cycle, ensuring the continuity of opportunities at all levels and specialisations, which allows effective continuation of the study process and improvement of the knowledge and competences acquired by students. The graduates of the academic Bachelor study programme may continue their studies after three years of studies in the academic Master study programme "Business and Management" or in the professional Master study programme "Aviation Management", obtaining the degrees in the field of economics and business or the qualification as an organisation manager, and then continue their studies in the Doctoral study programme "Digital Economy and Entrepreneurship".

The programmes at all levels are united by a clearly visible and logical connection. One of the specializations of the Bachelor programme "Digital Business Management" includes the study courses "Information Technology", "Digital Marketing", "Digital Business Environment", which allows students to learn the tools of business management in the digital environment. The academic Master programme "Entrepreneurship and Management" strengthens the preparation of business managers by offering to learn the specializations "Business and Change Management" and "Business and Financial Management". The study courses "Smart Organization Management" and "Change Management" include such study topic as the impact of digitization on business. The professional Master programme "Aviation Management" is based on the professional courses in the aviation industry: "Airport Management" and others, which use the digitalisation tools as management tools. The study course "Innovation Management" addresses aspects of the 4.0 revolution based on SMART

technologies. The study course "International Marketing and Advertising" covers the topics of digitalization in marketing and the elements of digitalization in advertising. The Doctoral programme brings together in a logical way the knowledge of the doctoral students in Economics and Business and develops the competences in the field of digitization of both the economy and the business environment. Therefore, it can be seen that there is a logical continuation of the courses and a connection between the Bachelor, Master and Doctoral level programmes.

The field of the study is accredited until September 2, 2026, accreditation sheet No. 2020/79.

3. Analysis of the compliance with the study field of the study programme to be included in the study field's accreditation sheet

The doctoral study programme "Digital Economy and Business" according to the structure of the programme fully corresponds to the programme group "Management and Administration", code 345, of the Latvian Classification of Education (Cabinet of Ministers Regulation No. 322 of June 13, 2017 "Regulations on the Latvian Classification of Education"), which is included in the thematic area of education "Commercial Sciences Business and Administration", within the thematic group "Social Sciences, Commercial Sciences and Law".

The doctoral study programme "Digital Economy and Business" corresponds to the study field "Management, Administration and Real Estate Management", as 85% (22 CP) of the total amount of the theoretical courses of the study programme comprises the study courses belonging to the field of economics and business studies.

The programme pays particular attention to the pedagogical practice of doctoral students. The internship can be organised as teaching in a lecturing course for the students of the relevant Bachelor programme or as a supervision of a Bachelor thesis. A course in the amount of at least 2 credit points must be offered for lecturing or, accordingly, in the case of the supervision of the Bachelor theses, supervision of at least two Bachelor theses must be undertaken. In total, the theoretical part of the programme accounts for 27 % or 32 credit points, while 73 % or 88 credit points are allocated for the development of the doctoral thesis.

The amount of the limited elective part is 6 credit points. Depending on the topic on which the doctoral thesis is being written, the doctoral student may choose either the course "Contemporary Economic Problems" or "Contemporary Business Management". After the second year, the doctoral student takes the appropriate doctoral examination and presents the theoretical part of the thesis to the committee. In addition, the study programme includes a free elective part in the amount of 6 credit points. The free elective part for foreign students is 4 credit points, because, according to Article 56 (7) of the Law on Higher Education, the compulsory study course "Latvian Language for Foreign Students" in the amount of 2 credit points is acquired.

At the end of the study programme, students are required to develop a doctoral thesis, as well as to participate in the international conferences and to prepare scientific publications in accordance with the Law on Scientific Activity of the Republic of Latvia, the procedure and criteria for awarding (promotion) of the Degree of Doctor of Science (doctoral dissertation) stipulated by the Cabinet of Ministers Regulation No. 1001 of August 14, 2018 "Procedure and Criteria for Awarding the Doctor of Science Degree (Doctoral Dissertation)".

Students of the study programme acquire knowledge, skills and competences corresponding to level 8 of the European Qualifications Framework (EQF). The graduates of the study programme publicly defend their doctoral thesis in the field of economics and business. In accordance with Article 10 (21) of the Law on Scientific Activities, which stipulates that "The diploma of the Doctor of Science shall

indicate... the relevant group of scientific branches ... ", and as it is specified in the regulations of the Cabinet of Ministers No. 202 of 16.04.2013 "Procedure for issuing state - recognized documents certifying higher education", the awarded degree of Doctor of Science "Doctor of Science (PhD) in Social Sciences". A specimen of the diploma is attached as Annex1.

The Institute of Transport and Telecommunications does not yet have a delegated the right to promote in the field of economics and business. The Cabinet of Ministers delegates the right to award (promotion) a doctoral degree (doctoral promotion) in science to a higher education institution on the basis of an opinion of the Latvian Council of Science (LCS), which, in accordance with Article 11 (3) of the [Law on Scientific Activities](#), is issued by the LCS only for an accredited doctoral study programme. The Institute of Transport and Telecommunications will only be able to request this opinion from the LCS after the accreditation of the doctoral programme "Digital Economy and Entrepreneurship", in other words, after the study programme has been included in the accreditation sheet for the field of study.

Taking into account that "Turība University of Business" has been delegated the right to award doctoral degrees in economics and business and a permanent Doctoral Council in economics and business has been established, TTI and Turība University of Business have concluded an agreement that if the Institute of Transport and Telecommunications will have not established the Doctoral Council by the time of the first doctoral thesis defence and TTI will not have yet been granted the right to award the doctoral degrees in the field of economics and business science, then Turība University of Business will give the graduates of the doctoral study programme of TTI the opportunity to defend their doctoral theses in Turība University of Business doctoral thesis council. Agreement with Turība University of Business is in Annexe 2, Sample of the Study Agreement is in Annexe 3.

II. CHARACTERISTICS OF THE STUDY PROGRAMME

1. 1. Characteristics of the study programme (parameters)

1.1. Study Programme Parameters

2.	Title of the study programme	Digitālā ekonomika un uzņēmējdarbība
3.	Title of the study programme in English	Digital Economy and Business
4.	Study programme code according to the Latvian Classification of Education	51345
5.	Scientific branch of the study programme (applicable to the doctoral programmes)	Social Sciences: Economics and Business
6.	Type of the study programme	Doctoral study programme
7.	Obtainable qualification level (National qualifications framework (NQF)/ European Qualifications Framework (EQF))	8
8.	Scope of the study programme (CP, ECTS also recommended)	120 KP (180 ECTS)
9.	Form, type, duration of implementation (if less than one year, indicate in months) and language of implementation	

	Full time face to face	3 years	Latvian and English
	Part time online	4 years	Latvian and English
10.	Place of implementation	Transport and Telecommunication Institute, Lomonosov Str. 1, Riga, LV-1019, Latvia	
11.	Admission requirements	<ul style="list-style-type: none"> • Master Degree in Management, Economics and Business or equivalent education • Master degree in other social sciences, educational sciences or equivalent education, for a person with at least two years of professional work experience in the management of companies and institutions • Master degree in natural sciences, engineering or equivalent education, for a person with at least two years of professional work experience in the management of companies and institutions • All applicants must take the entrance exam for the doctoral study programme • For studies in English: a test score of at least B2 level from an internationally recognized testing institution, or the TTI entrance exam must be taken in English, except in cases where the previous education was obtained in English. 	
12.	Awarded degree, professional qualification or degree and professional qualification, including also specialization (if applicable)	scientific doctoral degree Doctor of Science (PhD) in social sciences.	
13.	Professional standard, year of its approval (if applicable)	Not applicable	
14.	The final exam at the end of the study programme	Defence of the thesis	
15.	Director of the study programme	Dr. oec., Professor Inna Stetsenko phone: 29130530, e-mail: Stetsenko.I@tsi.lv	

1.2. The objective of the Study programme

The aim of the programme is to enable the doctoral students in Economics and Business to acquire top level study methods and principles of research work organisation and management, to be fluent in navigating the digital entrepreneurship and economics, to prepare qualified specialists for independent scientific and pedagogical work, to acquire internationally comparable competence in economics and business science and an internationally recognised scientific doctoral degree in Social Sciences.

1.3. Objectives of the study programme

In order to achieve the programme objectives, the following **objectives** have been developed:

- To enable the doctoral students to carry out independent scientific research on a chosen topic and to acquire the skills and principles of scientific research work;
- To provide the doctoral students with the opportunity to acquire the highest level of knowledge and skills appropriate to their profile, and to develop the professional relationships that will enable

them to succeed in conducting the future scientific research in the field of digital economy and entrepreneurship, as well as in the development of interdisciplinary research topics;

- To develop the research skills related to the identification of problems, hypotheses or research questions, formulating the key questions, the study of the research plan, collecting data and planning the analysis;
- To train young researchers who are able to systematise and methodologically analyse the primary and the secondary data using the classical and modern qualitative and quantitative methods in order to relate the obtained results to the theoretical knowledge, and to introduce new research approaches;
- To provide in - depth learning of economic theory and business economics, to create new business models for complex systems arising in the technical sciences;
- To create opportunities for disseminating the results of the doctoral research conducted within the international scientific community;
- To provide the doctoral students with the knowledge, skills and abilities necessary to carry out the independent scientific research work in the future, using the latest achievements of academic and practical science worldwide.

1.4. Learning outcomes to be achieved

Knowledge and understanding:

- expanding knowledge about the basic principles of digital economy and business functioning, economic and political development trends in Latvia, Europe and in the world (Learning Outcomes (LO) 1);
- in-depth knowledge and understanding of the role of economic and political research in the development of the society (LO 2);
- ability to manage methodologies and modern research methods in the field of economics and business (LO 3);
- understanding of the interdisciplinary approaches both in research and in general pedagogy (LO 4).

Skills:

- highly developed skills and abilities which are necessary to independently evaluate and select methods appropriate to the research, to contribute to the extension of knowledge and to be able to provide new insights into existing knowledge and its application in practice;
- the ability to develop an understanding of the topicality and relevance and patterns of socio-economic processes taking place in Latvia and in the world, to analyse and to evaluate the digitalisation development trends and processes, and the ability to use the most important applied achievements in the field of data science in business;
- the ability to explain and present the results of their research in a reasoned manner (LO 6);
- the ability to discuss the current economic and business issues with both professionals and the public (LO 7);
- the ability to lead and/or coordinate the multidisciplinary research groups and/or work and to collaborate in an international context (LO 8);
- the ability to identify, formulate and solve non-standard strategic challenges from real-world practice, developing an understanding of collaboration at inter - disciplinary level (LO 9);

Competencies:

- to be able to propose independently the research ideas in the field of digital economy based on knowledge of global economic development trends and existing policies; to plan, to structure and to manage the large - scale scientific research projects, including the international ones (LO 11);
- to be able to assess independently and analyse critically the major research or innovation challenges in the digital economy and to forecast the prospects of business development (LO 12);
- to be able to implement an interdisciplinary approach to research, to analyse critically and synthesise using economic research methods and theory (LO 13);
- to be able to develop independently the study content, teaching methods, to apply different teaching methods and to manage the teaching process, to use successfully the self-organisation and self-improvement skills (LO 14).

2. Relevance of the study programme

2.1. The grounds for the establishment of the study programme, its relevance to the industry trends in Latvia, the European Union and the world

The programme was developed in accordance with the development trends of the industry and the doctoral studies in Europe and the world, based on the recommendations of the World Bank researchers regarding the doctoral level studies (<https://www.izm.gov.lv/lv/pasaules-bankas-petijums>), where it is emphasized that the goal of the doctoral studies is the development of the young researchers and the promotion of innovations based on original research. The Sustainable Development Programme for 2030¹, adopted by the UN General Assembly on September 25, 2015, sets out 17 most important global development goals. They are aimed at the balanced development of the world's economies. The implementation of the doctoral study programme "Digital Economy and Business" is related to the achievement of the following goals: quality education (Goal 4), industrialization, innovation and infrastructure (Goal 9) and sustainable cities and communities (Goal 11). The United Nations Environment Programme (UNEP) operates seven interrelated sub-programmes of action, including the digital transformation. The targets of digital transformation are described in the Medium-Term Strategy of UNEP 2022-2025².

The digital economy forms the basis for the development of all areas of life in the country, therefore the demand for highly qualified professionals in the field of digital economy and business is constantly growing. In 2019, UNCTAD's Division of Technology and Logistics published a *Report on the Digital Economy*³, which identifies the more intensive training of the professionals in information and communication technologies (ICT) as one of the challenges. The *Europe 2030* strategy⁴ and the *EU Ninth Framework Programme for the development of science and technology* set the goal of pan-European cooperation in the field of sustainable development of countries, science, innovation and digitization. The doctoral study programme "Digital Economy and Business" proposed by TTI will not only prepare the specialists in the field of digital economy, but will also promote the use of digital technologies to ensure the sustainable development of business.

¹ Take Action for the Sustainable Development Goals <https://www.un.org/sustainabledevelopment/sustainable-development-goals/>

² The United Nations Environment Programme strategy for tackling climate change, biodiversity and nature loss, and pollution and waste from 2022—2025. <https://wedocs.unep.org/bitstream/handle/20.500.11822/35875/K2100501-e.pdf>

³ DIGITAL ECONOMY REPORT 2019. https://unctad.org/system/files/official-document/der2019_overview_en.pdf

⁴ A Sustainable Europe by 2030. https://commission.europa.eu/publications/sustainable-europe-2030_en

A lot of attention is paid worldwide to the employment prospects of the doctorate holders and to the support for career development at the post-doctoral stage. It is expected that the holders of a doctoral degree are critical thinking, creative, autonomous and responsible researchers who, with their activity, make a contribution to both science and to promoting the transfer of new knowledge into economic practice. The doctoral study programme "Digital Economy and Business" corresponds to the trends of the formation of a European unified higher education space, or the Bologna process⁵, because the doctoral study programme has been developed as a third-cycle study programme with the learning outcomes formulated in accordance with the European Qualifications Framework.

In the development of the doctoral study programme content, the "Salzburg (II) recommendations" developed by the European University Association⁶ during the Bologna process were followed: it is research that makes the doctoral studies fundamentally different from the previous study cycles; the doctoral students should be provided with independence and flexibility in their growth as young researchers, ensuring an individual approach and systematic cooperation with the scientific supervisor, opportunities to consult with the high-level academic staff during the study process, implementing interdisciplinary, inter-institutional and sectoral cooperation-based studies; the doctoral programme should be implemented in an autonomous and responsible institution that fosters the research thinking and activity of doctoral students in order to develop the original research.

The digitisation processes are also among the priority objectives set of Latvia National Development Plan 2021-2027 (NDP-2027)⁷. The implementation of this goal requires addressing the challenge related to training the specialists in the field of digital economy and sustainable entrepreneurship development, but in Latvia – as in the other Baltic States – there is no doctoral programme in the field of digital economy, which is the reason for justification of the need to implement a doctoral programme in Digital Economy and Business.

*Latvian Sustainable Development Strategy 2030*⁸ states in the description of Goal 237: "The Internet and the digital environment not only enable access to services and information, but also offer opportunities for remote working and education, while reducing the need for and frequency of transport". This means that the use of the Internet will allow people in Latvia to do some of their work from home and use less of transport, moreover, under the conditions of digitalisation of the economy the relationship between employee and employer will change. The Goal 448 of the Strategy *Latvia 2030* is related to e-government. "The introduction of e-government should be used to structurally reform the existing public administration, making it more efficient..." The creation of a new model of relations between both natural and legal persons will also create new forms of public administration, and the challenges related to its creation and functioning must also be addressed on the platform of the digitalisation of the economy.

The programme "*Guidelines for Science, Technology Development and Innovation 2021-2027*" (ZTAIP 2027)⁹ developed in Latvia is a medium-term policy planning document. It states: "In order

⁵ European Commission/EACEA/Eurydice. The European Higher Education Area in 2018.

http://www.viaa.gov.lv/library/files/original/Bologna_Report_2018_2_.pdf

⁶ European University Association. European universities' achievements since 2005 in implementing the Salzburg principles. <https://eua.eu/downloads/publications/salzburg%20ii%20recommendations%202010.pdf>

⁷ NATIONAL DEVELOPMENT PLAN OF LATVIA FOR 2021-2027. https://www.pkc.gov.lv/sites/default/files/inline-files/NAP2027_ENG.pdf

⁸ Sustainable Development Strategy of SAEIMA OF THE REPUBLIC OF LATVIA Latvia until 2030.

https://www.varam.gov.lv/sites/varam/files/content/files/lias_2030_en.pdf

⁹ *Zinātnes, tehnoloģijas attīstības un inovācijas pamatnostādnes 2021.–2027. gadam*. <https://likumi.lv/ta/id/322468-par-zinatnes-tehnologijas-attistibas-un-inovacijas-pamatnostadnem-20212027-gadam>

to improve the transfer of knowledge and technology, digital transformation of the R&D system will be carried out, streamlining the administrative and coordination processes of universities and scientific institutes, developing a culture of open science and ensuring the wide availability and usability of research data and results in society, while promoting cooperation between business and public in developing sector research and innovation".

Comparison of Programmes

The doctoral study programme in Digital Economy and Business, provided by TTI, is unique, so it is important to compare it with similar programmes abroad. The platform of the European Commission¹⁰ and the websites of universities providing the information on the doctoral studies were used to compare the doctoral study programme in Digital Economy and Business with similar programmes in other European countries.

European universities offering similar programmes were selected for a comparative analysis. The list of these universities includes the following ones: the University of Surrey (UK), Helsinki School of Economics (Finland), Friedrich Schiller University Jena (Germany) and University of Genoa (Italy).

The doctoral study programme Digital Economy, Entrepreneurship and Innovation provided by the University of Surrey in the UK includes modules on Macroeconomic Theory, Macroeconomic Topics, Microeconomic Theory and Macroeconomic Modelling

The theoretical course of the doctoral study programme "Entrepreneurship, Management and Organisation" provided by the Helsinki School of Economics (Hanken) in Finland is amounted of 30 credit points (ECTS) and includes in-depth study of Microeconomics and Macroeconomics as well as Econometrics. In the second year of studies, the organisation of the doctoral workshops is compulsory, which is also included in the curriculum of the Institute of Transport and Telecommunications.

The Friedrich Schiller University of Jena in Germany is implementing a doctoral study programme entitled "Digital Transformation", the theoretical part of which also comprises a block of Microeconomics, Macroeconomics and Econometrics.

The University of Genoa also offers such courses as Microeconomics, Macroeconomics, Applied Economics, Political Economy, Econometric Statistics, Economic History and The History of Economic Thought.

It should be noted that the doctoral study course "Digital Business and Society", provided at the TTI doctoral study programme covers the topics of Microeconomics course, but with an emphasis on the specificities of the impact of digitalisation in the particular sectors. The themes, similar to the Political Economy course provided by the University of Genoa, are included in the course of TTI's doctoral programme Digital Business and Society, which focuses on the political economy aspects of the impact of economic transformation on the society. The Macroeconomic issues are covered in the Digitalization of Finance course, which examines the impact of digital technologies on the global financial markets. Econometrics course is also represented in the TTI doctoral programme. It should be noted that a doctoral seminar is run at all universities and at TTI.

Taking into account the strategy implemented by TTI and the development priorities of Latvia set out in the "Latvia 2030" Programme Document, the programme includes a course on "Digital Business and Society", which focuses on the digital enterprises, online entrepreneurship, aspects of entrepreneurship and innovation, as well as disruptive technologies. The Econometrics course provides an introduction to the mathematical methods used in Economics, which corresponds to the practice of the European universities. In the third semester, the course "Big Data Analysis for

¹⁰ Eurydice: https://eacea.ec.europa.eu/national-policies/eurydice/content/third-cycle-phd-programmes_en

Executives" is planned; it will enable the doctoral students to acquire skills and competences in the use of big data and will help to prepare a new level of managers for both public bodies and business structures to work in the conditions of a digitalised economy.

Key findings:

Three criteria were used for comparison and the results are as follows:

- 1) ECTS. Doctoral studies in the EU countries last from 3 to 4 years, which means from 180 to 240 ECTS.
- 2) The doctoral study system. The following models have traditionally been implemented for the doctoral studies:
 - 2.1. Course system. Courses can be compulsory or elective.
 - 2.2. The doctoral students participate in seminars and sections on the research problems; senior doctoral students present their research results.
 - 2.3. The doctoral students work exclusively with their supervisor and he/she specifically teaches the research to the doctoral student in a focused way.
 - 2.4. The doctoral student works on a specific research project and acquires the necessary competences by working in a team of experienced researchers.
- 3) Offer of the study courses. The most taught study courses are as follows:
 - 3.1. Research Methods (Philosophy of Science);
 - 3.2. Microeconomics, Macroeconomics, Econometrics and the Digital Economy.

Therefore, the analysis confirmed that the doctoral study programme "Digital Economy and Business" proposed by TTI corresponds to the European sustainable development trends and the directions of training highly qualified personnel in the field of digital economy and entrepreneurship.

2.2. Outline of the study programme

The doctoral study programme "Digital Economy and Business" was developed based on the following external and internal laws and regulations:

- Law on Higher Education Institutions of the Republic of Latvia, Saima of the Republic of Latvia, 02.11.1995.
- Law on Scientific Activity, Saima of the Republic of Latvia, 14.04.2005
- Regulation of the Cabinet of Ministers No. 595 "Regulations on the groups, branches and sub-sectors of Latvian science", 27.09.2022.
- Regulation of the Cabinet of Ministers No. 320 "Procedures for Granting the Rights of Expert of the Latvian Science Council and Establishing the Expert Commissions of the Latvian Science Council", 09.07.2019.
- Regulation of the Cabinet of Ministers No. 1001 "Procedures and Criteria for the Award (promotion) of the Degree of Doctor of Science ", 27.12.2005.
- No. 202 "Procedure for Issuing State-recognised Documents of Higher Education", 16.04.
- Regulations on the Doctoral Studies, approved by the TTI Senate on 28.06.2007.
- Regulations on the procedures and criteria for awarding a doctoral degree (doctoral dissertation), approved by the TTI Senate on 22.02.2006.
- Regulations on the Management of Study Directions and Study Programmes, approved by the TTI Senate on 21.05.2019.

The scope of the study programme is 120 CP, with academic and independent scientific research work in the amount of 20 CP each semester.

The structure of the programme is designed in such a way that the study courses included in it are logically connected and sequential, allowing achieving the study outcomes defined in the programme.

The study at the programme starts with the course "Methodology of Scientific Research", which deals with the structure of the doctoral student's research, the formulation of the research hypothesis, setting the goals and objectives of the research, the definition of the subject and object of the research, the investigation of the types of scientific research and projects, studying the methodology of scientific research and the factors that characterise the project. The instruments of the scientific research are also discussed: mathematical apparatus, modelling, experiment, software, expert data. This completes the task of carrying out an independent scientific research work on a chosen topic and the acquisition of the skills and principles of the scientific research work and developing the skills that enable the researcher to identify a problem, formulate a hypothesis or put forward the main research question, develop a plan for research, data collection and analysis to be carried out.

The course "Digital Business and Society" is based on the acquisition of knowledge about the development and the use of digital technologies, as well as the theories of development of technologies and digital economy, platforms and digital ecosystems. The implementation of this course is aimed at fulfilling the objectives of the doctoral study programme, namely, to prepare young scientists – economists – who are able to systematize and methodologically analyse primary and secondary data, using classical and modern qualitative and quantitative methods, to ensure in-depth learning of economic theory and business economics, to develop new business models for complex systems arisen in the technical sciences and to create opportunities for the dissemination of the results of the doctoral research in the international scientific environment.

The course also covers the issues of Microeconomics, allowing the doctoral students to gain knowledge of modern approaches to the application of microeconomic concepts to the economic research and the latest research methods in the field of economics.

The Digital Business and Society course is logically followed by the course "Strategic Management and Digital Business". This course also contributes to the achievement of the aims and objectives of the doctoral study programme, including providing an in-depth study of Economic Theory and Business Economics and generating new business models for complex systems emerging in the technical sciences. The study of the specifics of the Digital Economy and the specificities of management related to the digital entrepreneurship is a topical challenge from the point of view of the national economic development. Management of the digitalisation processes in the economy will create new impulses for the development of both public and private enterprises and provide additional value added to the business environment.

Macroeconomic issues specific to the EU doctoral programmes are covered in the course "Digital Financial Services", the main objective of which is to enable students to understand how technology is transforming the economy and business environment through the analysis of digital financial services, new financial business models and the innovative role of FinTech. The core of these dimensions lies in the digital economy and business. The course will enable the doctoral students to gain knowledge of the key economic and social indicators, the characteristics parameters and development of the global economy and finance, and to become proficient in the use of comparative analysis techniques. The course will provide students with knowledge base for strategic management decision-making in the era of digital transformation. This sequence of courses is a logical conclusion to the study and learning of the issues connected with Macroeconomics and Microeconomics in the framework of the doctoral study programme "Digital Economy and Business".

The following courses "Econometrics" and "Big Data Analysis for Executives" contribute to the following objectives: knowledge, skills and abilities necessary for implementation of the future

independent scientific research work, using the latest achievements of academic and practical scientific in the world. In addition, the high level of qualification of the lecturers involved in the implementation of these courses contributes to the objective of enabling the doctoral students to acquire the highest level of knowledge and skills appropriate to their profile and to establish the professional relationships that will lead to the future success in conducting the scientific research in the field of digital economy and entrepreneurship and in the development of the interdisciplinary research topics.

The course "Big Data Analysis for Executives" meets the current demand of the companies whose activity is based on analytics. These structures can include the transport and communications sector, the banking sector, and so on. The inclusion of this course in the doctoral study programme, in order to prepare highly qualified specialists for employment in both public and private structures will create an additional impetus for economic and business development in the country.

At the end of the study courses of social sciences (Digital Business and Society, Strategic Management and Digital Business, Digital Financial Services, Contemporary Economic Issues (PhD Seminar)), there is an exam and a report or case study are planned; it should present the framework and the structure of the research as a part of the doctoral thesis, including the research methods to be used. The topic of the report is discussed with the lecturer of the relevant course. In the study course Big Data Analysis for Executives, the doctoral students will complete one project assignment based on the statistical data related to the subject of their studies.

The most important part of the implementation of the doctoral study programme is the development of the doctoral thesis, for which 88 CP (132 ECTS) are allocated according to the study plan (see Appendix 4).

The development of the doctoral thesis includes several stages (see Table 1), within which the doctoral student acquires the required amount of credit points divided by semesters.

Table 1. Research work in the doctoral study programme, CP

№	Dissertation development and defence	Total, CP
1.	Preparation of the thesis	50
2.	Identification of used literature sources	8
3.	Preparation and presentation of the thesis	8
4.	Publication of the research results	10
5.	Presentation of the research results	12
	Total:	88

Each year, the doctoral student and the supervisor draw up a plan of the stages and scope of the doctoral thesis.

In the second year of studies, the doctoral students choose courses depending on their research topic, and the doctoral workshops are organised in the form of lecture courses, seminars and presentations. The lecture courses are delivered according to the course description (see Appendix 5). In order to discuss the topical issues, it is planned to invite the leading scientists and researchers from Latvia and foreign specialists to the doctoral workshops. The doctoral seminars are planned for the autumn semester of the academic year 2023-2024.

It is mandatory for the doctoral student to prepare a 30 - 40 minute presentation that provides an overview of the most important publications, methods and research results related to the research topic chosen by the doctoral student.

At the end of the workshop stage, the doctoral examination is held; it consists of two parts - the theoretical part with examination tickets and the presentation of the theoretical part of the doctoral thesis. The doctoral examinations Contemporary Economic Problems (6 CP) or Contemporary Business Management (6 CP) are taken according to the scientific interest of the student's doctoral research. The doctoral examination is assessed by a committee composed of at least three lecturers; the composition of this committee is approved by the Rector's order on the basis of a proposal from the Director of the doctoral study programme.

During the examination, the student is asked to answer two theoretical questions on the chosen course and a third question refers to the structure of the thesis. At examination the structure of the doctoral thesis is presented by the doctoral student as a research proposal in English, and after the presentation the committee discusses the structure and nature of the research with the doctoral student. On the basis of the results of the discussion, the candidate is also assessed on his/her proficiency in English. The doctoral committee includes L. Kuzmenko (the philologist).

Training of the young researchers and the university lecturers is linked to pedagogical work. The amount of block C is 6 CP (9 ECTS). Taking into account the interdisciplinary approach to the implementation of the doctoral study programme "Digital Economy and Society", the doctoral students are offered the possibility to take a course (at least 4 CP, 6 ECTS) at both the Faculty of Engineering and the Faculty of Transport and Management Sciences, in agreement with their supervisor and the director of the doctoral study programme. The Doctoral students can take the course "Pedagogy", which introduces the basics of the university pedagogy. After completing the course, the doctoral students have the choice of teaching a lecture course or seminar classes (2 CP, 3 ECTS) or undertake supervision of the Bachelor theses (0.5 CP per each bachelor thesis) with the total number of points of 2 CP (3 ECTS).

The mapping exercise resulted in the refinement of some of the study programme and the study course outcomes. The lecturers involved in the development of the study programme discussed the content of the study courses in the context of the programme achievable outcomes, improved the developed study courses in order to avoid any duplication of their content and to ensure their continuity and complementarity. The repeated mapping of the programme and the course outcomes demonstrates clearly that the implementation of the study courses provides opportunities for the students to achieve all the intended learning outcomes. Study course mapping is presented in Appendix 2.

Doctoral students are offered the opportunity to carry out the research on the following main themes, which are in line with the strategy and scientific orientations of TTI:

- development of digital companies (e-commerce);
- doing business on the Internet;
- the impact of context on business strategy;
- motivation and responsibility for corporate data and big data;
- the role of innovation and technology;
- creation of research clusters in the regions;
- digital entrepreneurship of regions and cities;
- women in the digital economy
- digitalization of the economy and the environment, etc.

The fulfilment of the doctoral student's plan is monitored by the Council of Science and Doctoral Studies: at the beginning of each academic year, the doctoral students' work plans for the current year are approved and reports for the previous year are accepted. After the approval of the plan signed by

the thesis supervisor and the director of the doctoral study programme, the doctoral student is transferred to the next academic year.

At the end of the programme, the doctoral student submits the report to the Council of Science and Doctoral Studies on the number of publications, participation in conferences, completed courses and the prepared doctoral thesis.

2.3. List and justification of changes made to the study programme since the licensing of the study programme

Changes in the awarded degree. On the basis of the amendments of July 14, 2022, to Article 10, Part 2.1 of the Law on Scientific Activity, of October 25, 2022, to the Regulations of the Cabinet of Ministers of April 16, 2013, No. 202 "Procedure for Issuing the State Recognised Documents Certifying the Higher Education", and the Regulations of the Cabinet of Ministers of October 27, 2022, No. 595 "Regulations on Latvian Science Sector Groups, Science Sectors and Sub-Sectors", the title of the degree to be awarded in the doctoral study programme "Digital Economy and Business" (51345) is changed to **Doctor of Science (Ph.D.) in Social Sciences**.

Changes in the structure of the programme. When implementing the program in 2021 and 2022, found necessary to specify some theoretical courses. Since the licensing of the "Digital Economy and Entrepreneurship" program, the list of the changes made in the study program is given below in table 2:

Table 2. Changes to the programme structure

No.	Course title	CP	Justification for the change	Course title in the study plan after the change	CP
1	Microeconomic Concepts in Economic Research	2	Course topics merged into one course and course title updated accordingly	Digital business and society"	6
2	Digital Economy and Society	4			
3	Global Economy and Finance	4	Course title clarified and course content expanded to include topics on digitisation of financial markets	Digital financial services	4
4	The challenges of running a business	6	Course title clarified	Modern Business Management	6
5	Modern survey data analysis methods	4	Course changed in line with short-term expert recommendations. Course changed before the first students are admitted to the programme	Econometrics	4

The introduced changes make it possible to strengthen the learning outcomes of the doctoral study programme in the field of economy and business digitization (see Figure 1).

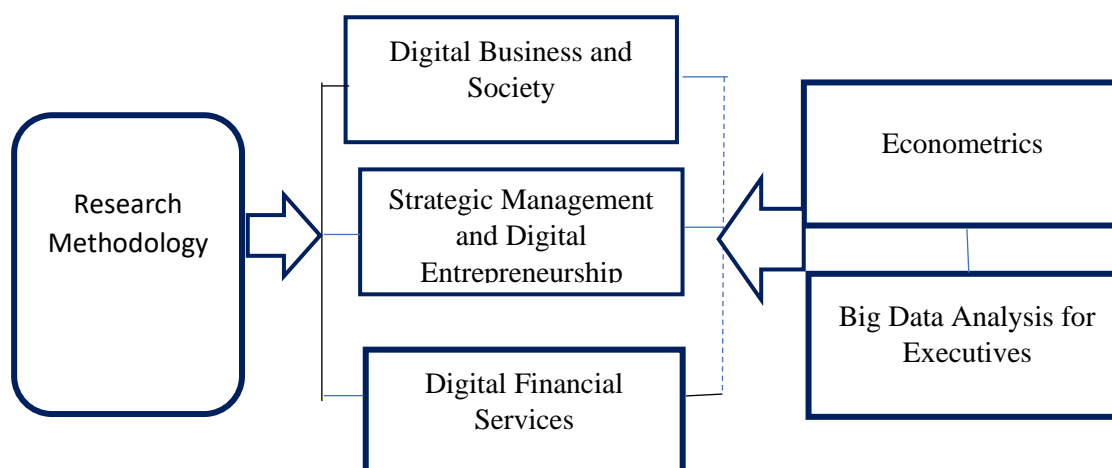


Figure 1. Model of implementation of the compulsory courses of the study programme "Digital Economy and Business" after changes

Figure 1 above illustrates the logic of Part A of the programme: since the course in Global Economy and Finance in the amount of 4 CP (6) has been replaced by the course in Digital Financial Services in the amount of 4 CP (6); this reinforces the subject of the study of the doctoral study programme, namely the impact of digitalisation on different business areas. The course "Microeconomic Concepts in Economic Research" is integrated into the course "Digital Business and Society" and the amount of credit points is increased, which avoids duplication of topics and demonstrates the development of the processes of digitisation in both industry and business. Therefore, the attention is focused on how the technological processes affect the business environment and reinforce the learning outcomes of the programme (LO 1, LO 2, LO 8, LO 12)

The courses "Big Data Analysis for Executives" (2 CP) and "Research Methodology" (2 CP) have been retained unchanged, while the course "Modern Survey Data Analysis Methods" (4 CP) has been replaced by the course "Econometrics" (4 CP), as recommended by the Licensing Committee.

2.4. Statistical data on the number of students enrolled in the study programme and an analysis and assessment of the comparison with the planned number of students within the licensing procedure (when analysing, separate out the different study forms, types and languages of study)

The implementation of the programme was launched in March 2022, after the Study Quality Commission decided on the permission to authorise the programme in English. In the spring semester of academic year 2021/2022, 4 students were enrolled in the programme: 3 foreign students (language of instructions is English) and 1 student from Latvia (language of instructions is Latvian). Also in academic year 2022/2023 (autumn semester), 4 students were enrolled, while in the spring semester, 5 more doctoral students started their studies, two of them from Latvia. Therefore, in terms of the geographical origin of the students in the doctoral study programme, the following countries are represented: Latvia (3), Uzbekistan (3), Kazakhstan (2), Belarus, Russia, Cyprus and Cameroon. The graph shows that the share of foreign PhD students is 75% (Figure 2).

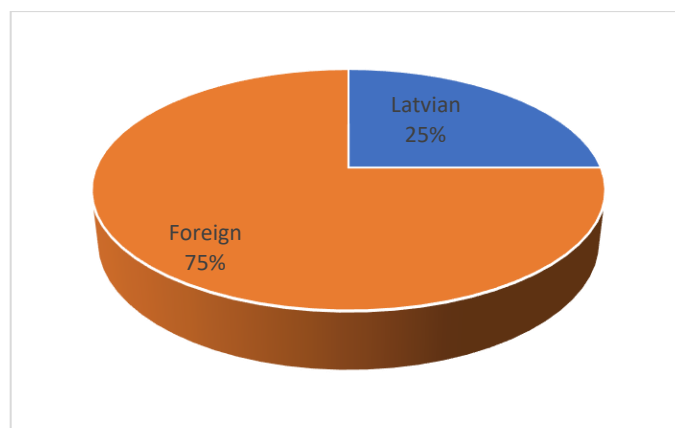


Fig. 2 Shares of Latvian and foreign doctoral students on 01.03.23, %

Three students study in Latvian, while the other 9 doctoral students study in English. In terms of the study form, the distribution is as follows: full-time face to face study – 9 people, part time online study – 3 people.

Thus, it can be concluded that the programme has a great potential for the development. It is assumed that the accreditation of the programme and the establishment of the Promotional Council for the defence of doctoral theses will increase the number of students in the doctoral study programme and to promote the "Digital Economy and Business" doctoral study programme not only in Latvia, but also in foreign countries.

The topics of doctoral theses approved by the doctoral students of the programme are as follows:

- Aspects of the concept of the transport sector's sustainable development, scientific supervisor Prof. I. Stecenko;
- Digital business development for women in Uzbekistan, scientific supervisor Prof. I. Stecenko;
- Competitive global brands governance in the sports industry, scientific supervisor Prof. I. Kuzmina-Merlino;
- Digital transformation of education in Uzbekistan, scientific supervisor Assoc. Prof. J. Popova;
- Digital Transformation of Aviation Maintenance Organisation in the Digital Economy, scientific supervisor Prof. I. Kabaškins;
- Development of digitalization of the banking sector of the country in the conditions of economic restrictions and sanctions, scientific supervisor Assoc. Prof. N. Podolakina;
- Digital marketing communication in online education, scientific supervisor Assoc. Prof. J. Popova;
- Development of pricing methodology in product IT companies, scientific supervisor Prof. B. Mišņevs;
- The Impact of the Development of Artificial Intelligence on Digital Business, scientific supervisor Assoc. Prof. J. Popova;
- Promotion of the digital twins in aviation industry, scientific supervisor Rezekne Academy of Technologies, Prof. Dr. oec. Iveta Mietule, TTI assoc. prof. Iyad Alomar;
- Digital Transformation and Labor Productivity Growth in Sub-Saharan Africa: A Reallocation Channel Analysis, scientific supervisor Prof. Y. Stukalina;
- Sustainable Business Model in Online Education area, scientific supervisor, Assoc. Prof. J. Popova.

The topics of the doctoral theses correspond to the programme implemented in the field of Economics and Business, the topics are interdisciplinary in nature. For example, a doctoral student, developing a doctoral thesis on the topic *Development of pricing methodology in product of IT companies*, under the supervision of Prof. I. Stecenko and Prof. B. Mišņevs, plans to create the software for the project cost calculation. In the theoretical part, it is planned to study the cost formation models in the IT sector. In the research of the doctoral thesis Promotion of the digital twins in aviation industry (supervisors Dr.oec. Iveta Mietule and assoc. Prof. Iyad Alomar), the possibility of using the digital twin model for testing in air transport is also considered, but in the work the researcher's attention is focused on the promotion of this product, which also makes the study multidisciplinary.

The supervisors of the doctoral theses are not only the leading teaching staff of TTI, but also professors from the cooperating universities, invited to supervise the doctoral theses, for example, professor of Rēzekne Academy of Technology Iveta Mietule. An important achievement during the two-year implementation of the doctoral study programme is the conclusion of a contract with Professor Guillaume BODET from the Claude Bernard University of Lyon for supervision of Daniil Kulikov's doctoral thesis.

2.5.The Prospects of the Graduates' Employment

The World Economic Forum of 2018 estimated that the size of the digital economy was D 11.5 trillion US dollars in 2015 (16% of global GDP) and is projected to reach 23 trillion trillion US dollars in 2025 (24% of global GDP)¹¹. Taking into account the fact that the access to the internet is constantly increasing, the country's opportunities for economic development and social inclusion are expanding; however, at the same time the challenges of not only promoting products, but also ensuring the quality of service and staff qualifications, job losses and social security are expected to become greater. According to the European Commission, the size of the digital economy will grow by 5% by 2025, which also requires the countries to train the professionals to help tackle a range of challenges and tasks. In 2016, the OECD launched a report that looked at the impact of computing power, big data, internet penetration, artificial intelligence, the Internet of Things and online platforms on the professions of the future. The digital economy is seen as a key speciality that will reduce the risks of job vulnerability, inequality and mass "technological unemployment"¹².

According to the European Commission data, in Latvia in 2020, the employment in the field of knowledge-intensive services accounted for 2.5% and in the field of high-tech for 3.1% of total employment, while in Estonia the corresponding shares of employees were 3.8% in the field of knowledge-intensive services and 4.6% in the field of high technology¹³. The digitalisation of society and the increase in the volume of innovative products in national markets create a need for highly qualified professionals in these areas who are able to create and to implement the innovative ideas in both sustainable businesses and in the work of public institutions¹⁴.

The doctoral study programme "Digital Economy and Business" can help to address a number of challenges and issues that exist in the field of digitalisation of the economy and entrepreneurship development, and which have to be solved not only for Latvia, but also for the world as a whole. Some of the most important issues and challenges are as follows:

- development of the social policy directions to reduce the risk of employees when changing work under the conditions of digitalization;
- separation of responsibilities of the business environment and the government, so that they can deepen the digitalization processes of the economy and business;
- anticipation of skills and competences in the era of digitization in local labour markets;
- promotion of digitization processes in the green economy;
- usage of the digital economy to address the challenges of a sustainable social security system and e-government work;
- creation of a digital transformation ecosystem that includes all organizations and all stakeholders supporting the development of SMEs (for example, incubators, high-tech parks, digital innovation centres, universities);
- current trends in the development of blockchain technology and digital currencies.

¹¹ World Economic Forum: We have the tools to reskill for the future. Where is the will to use them?
<https://www.weforum.org/agenda/2018/01/tools-reskill-future-will-labour-disruption-automation>, 2018

¹² Report of OECD <https://www.oecd.org/els/emp/Policy%20brief%20-%20Automation%20and%20Independent%20Work%20in%20a%20Digital%20Economy.pdf>

¹³ Future Jobs | Skills Panorama (europa.eu)

¹⁴ Eurostat, Database - Eurostat (europa.eu)

3. Resources and provision

3.1. Characterization and estimation of the study base, science base (if applicable), informational base (including library), material and technical base and financial base and assessment of compliance with the conditions for the implementation of the study programme and ensuring the achievement of the study outcomes, and the changes made since the start of the study programme implementation, their effects to the quality of studies.

Characteristics of the material and technical base

TTI provides students with a full-fledged study process: well-equipped premises, a modern library, contemporary computers and the internet access. The study programme is implemented in the educational building with a total area of 13 567.10 m², located at 1 Lomonosov Street, Riga. Currently, the classroom stock includes 12 lecture auditoriums, 10 computer classrooms, more than 20 rooms for practical and laboratory classes. The area of the study and scientific work rooms is 9638 m², the area of the sports and recreation rooms is 2879 m². All auditoriums are spacious, bright, equipped with heating and ventilation systems, internet connection, screen, comfortable furniture. They are arranged according to the number of students. A secure wireless computer network is available in the TTI building. The students can connect to a wireless computer network secured by the PaloAlto New Generation Firewall. Practically all lecture halls are equipped with visual display equipment, and all lecture auditoriums have powerful stationary video projectors or large TVs. There are 10 computer labs equipped with the computers to ensure the learning process.

TTI offers its students to use Office365, which allows them to use the full Microsoft Office, OneDrive file storage at no extra cost. While studying at TTI, the students have access to all the software they need for a successful study process. The students can install Microsoft Office applications – Word, Excel, PowerPoint, OneNote on five computers (PC or Mac) and five mobile devices (for example, smartphone, laptop and tablet). The student can use OneDrive 1 TB for automatic synchronisation of devices.

The e-learning environment or Moodle platform is used as a tool to organise the study process in each study course. The compulsory teaching methodological set for each course which must be hosted on Moodle is defined in the *Regulations on the Study Management System of TTI*. The e-learning environment is used for the exchange of the study materials and communication between the students and the lecturers, submission of examination papers, tests and control works, and so on. The students and teaching staff can get acquainted with the internal and external regulatory acts, methodological instructions for the development of final examination papers, internship programmes and other internship documents, application forms, etc. are available here; up-to-date information on student life and upcoming events is published here. E-studies are accessible 24 hours a day from any location with the Internet access.

The open source web conferencing system *BigBlueButton*, linked to Moodle, is used for the remote classes. This system is designed for online learning and supports the real-time audio, video, slides, chat and screen sharing. In addition, lecturers can record their lectures and later play back the content to share with the students. The *Online Classroom* function of the system allows the registration of the participants of the lecture and thus provides the possibilities of monitoring the students' participation.

The Moodle system can also be accessed from the mobile applications, which extends the possibilities of using the system. A separate module is designed for distance learning.

The e-learning environment is an important tool for organising the study process in each course. For each course, there are methodological teaching materials, which include a description of the course, a

methodological (calendar) plan for the current semester, independent work assignments planned for the study course, self-test assignments, exam questions, other teaching materials used for independent study of the study course (lecture materials, presentations, various supplementary materials, etc.)

The student's ID card, the study plan for the entire study period and the grades posted in the study courses for all students of TTI are available in the TTI internal information system Intranet. The list of classes is also available here for full time on site and part time correspondence students and teaching staff.

Characteristics of the Study Base

Doctoral study programme "Digital Economy and Business " in cooperation with the lecturers of the Faculty of Engineering of TTI, is implemented in the field of study "*Management, Administration and Real Estate Management*" at the Faculty of Transport and Management Sciences. The faculty provides 24 CP (theoretical part – or 75%) of the doctoral study programme, while the academic and scientific staff of the Faculty of Engineering are involved in the implementation of the other study courses. Other departments of TTI are also involved in the implementation of the study process.

- Doctoral department - plans the study process (planning the lectures, lecturers' work, etc.), organizes work with students (consultation and information provision, work with student documentation, record of study results, payment control, etc.).
- Library – provides students and lecturers with the educational and scientific literature.
- Department of Research Administration – ensures the high-quality preparation of young scientists and involvement of doctoral students in the scientific research.
- Department of the corporate clients – organizes and ensures the cooperation with companies.

The scientific base consists of the laboratories, databases, diverse software and scientific resources at the disposal of TTI. Modern equipment and laboratories are available for various research needs.

The laboratories of TTI provide the access to equipment and special software purchased for scientific research purposes. The laboratory facilities are actively used by students for the development of their doctoral theses and for the needs of doctoral students. More information on the laboratories and research clusters is here: <https://tsi.lv/research/research-at-tsi/research-clusters/>.

The Laboratory of Applied Research and Modelling (SimLab) is a multidisciplinary scientific research laboratory providing TTI students, faculty and researchers with access to the software products, some of which are unique. The range of software is wide, from simulation modelling tools: PTV VISSIM & VISUM – software for modelling the transport flows; AnyLogic – universal modelling software; Aris, BPWin, Busines Object – business process modelling software; finally, the software for data processing and mathematical calculations: R, SPSS, STATISTICA, MatLab, Mathematica and others. The main objective of the laboratory is to provide students, researchers and faculty with an access to the software, as well as to provide consultations on the use of the software. In addition, the laboratory is used for the implementation of scientific projects and contract research.

TTI supports an open-access policy by offering its equipment and software. TTI is a part of the UseScience project, which aims to share equipment between research and academic bodies.

TTI is a member of the European Conference of Transport Research Institutes (ECTRI) and its resources are included in the global transport research sharing database "Soft Research Infrastructures" and the TTI researchers can use more resources from ECTRI members (27 EU research institutes) at <https://www.ectri.org/about-ectri/members/>. In addition, the TTI Electronic Library, which provides journals, conference papers, books and textbooks in electronic form, is available to TTI students and academic and research staff.

All TTI research activities are administered, supported and documented by the Research Administration Department, which compiles them in an internal database. In addition, the department is responsible for the maintenance and accessibility of the research infrastructure and for updating the information in the National Scientific Activity Information System (sciencelatvia.lv).

General description of the library

The main goal of the library is to provide access to the library funds, electronic resources and information systems to the university students, staff and users of the library.

[The Library Terms and Conditions of Use](#) regulate the procedure for the provision of services, the duties, rights and responsibilities of the Library users, and the use of premises, systems and equipment. Three qualified employees work in the library: the Head of the Library and two librarians.

The library premises are in good technical and visual condition. The total area of the Library premises is 308 m². Of this total, 117 m² are available for users and 171 m² are storage rooms. The library's electronic reading room (72 m²) with 30 user places is ergonomically furnished with 15 stationary computers and with 15 workstations for personal devices.

The library's working hours is optimal, they are chosen based on the user flow measurements and in accordance with the schedule of study plans, providing services to both full-time and part-time students.

Working hours of library service points:

	Stocks	E-reading room
Monday	10.00 - 16.00	8.00 - 21.00
Tuesday	10.00 - 18.00	8.00 - 21.00
Wednesday	10.00 - 18.00	8.00 - 21.00
Thursday	10.00 - 19.00	8.00 - 21.00
Friday	10.00 - 16.00	8.00 - 21.00
Saturday	10.00 - 14.00	8.00 - 16.00

The library serves the students, academic and general staff of the university and every user in the country in accordance with the rules of the library use. Free and paid services are available to all Library users:

- Textbooks for home reading;
- On-site delivery of books in the scientific collection;
- Use of electronic books in TTI premises and remotely;
- Use of subscribed scientific databases in TTI premises and remotely;
- Reading room and e-reading room services;
- Copying / printing of materials in self-service mode (paid service);
- Inter-library loan (ILL) services;
- Consultations on the use of electronic resources;
- Consultations on the thematic information search in the electronic resources;
- Assignment of ISBN/ISSN numbers;
- Purchase of books from TTI publishing house (paid service)
- 19 users' computers;
- Wireless Internet connection.

Library information resources funds (for the year 2022):

1. Inventory – 28 546 documents, of which:

- books – 23 863 items, of which 5 260 items or 25% are intended specifically for the needs of the direction of Management and Economics,
- collection of e-books – 2 738 copies, about 250 items or 10% of them are intended specifically for the needs of the direction. The own collection contains documents from various publishers and suppliers of scientific information. For example: *Springer, Taylor&Francis, Elsevier*, etc. The indicators of usage are shown in Figure 1;
- periodicals – 1 838 items, 550 items or 30% of them are intended specifically for the needs of the programme.

Students of the doctoral study programme "Digital Economy and Business" have the opportunity to use the library funds, which is mainly made up of the publications published after 2018. In the last two years, several purchases of new books in the field have been made, both in print and in the electronic format. In total, they amount to more than EUR 6 000. Some examples of them:

E-books:

- Hoe, S. L. (2022). Digital transformation: Strategy, execution and technology. Auerbach Publishers, Incorporated.
- Jelassi, T., & Martínez-López, F. J. (2020). Strategies for e-business: Concepts and cases on value creation and digital business transformation. Springer International Publishing.
- Olson, D. L. & Wu, D. (2020). Enterprise risk management models. Springer Berlin.
- Schmarzo, B., & Borne, K. (2020). The economics of data, analytics, and digital transformation: The theorems, laws, and empowerment to guide your organization's digital transformation. Packt Publishing, Limited.
- Olson, D. L. & Wu, D. (2020). Enterprise risk management models. Springer Berlin.

Printed books:

- Wirtz, B. W. (2021). Digital Business and Electronic Commerce. Springer Cham
- Stark, J. (2020). Digital Transformation of Industry: Continuing Change (Decision Engineering). Springer.
- Fatehi, K. & Choi, J. (2019). Managing Internationally: Succeeding in a Culturally Diverse World. Springer.

As well as 6 printed journals (including the scientific journals):

- Balance. Accounting. Legislation. Finance. (Bilance. Grāmatvedība. Likumdošana. Finances)
- Balance sheet. Legal Advice (Bilance. Juridiskie Padomi)
- Practical Legislative Bulletin (Praktiskais Likumdošanas Ziņnesis)
- Academy of management Journal
- Strategic Entrepreneurship Journal
- Harvard Business Review

2. Subscribed databases (for the year 2021)

Academic Complete e-book database:

- the "Business/management" collection contains 25 952 book titles
- the "Economics" collection contains 13 988 book titles.

ScienceDirect. Multidisciplinary database of the publishing house Elsevier. Contains full texts of 4 604 titles of journals published by Elsevier, of which a dozen or so are thematically related to the topic of Business and Economics and are an important support for academic staff, researchers and students

in using high-quality, reliable scientific information in the development and research process of the studies. For example, the following journals are available:

- Digital Business
- Journal of Business Research
- European Journal of Management and Business Economics
- Research in Economics
- Journal of Economics, Finance and Administrative Science u.c.

SCOPUS is multidisciplinary scientific publication and bibliographic citation information database of the publishing house Elsevier. TTI information from SCOPUS is used to support scientific and research work.

Accessibility provision:

- The library's electronic catalogue contains records of the printed and electronic resources in the library funds. Access to the catalogue is from the library website <https://lib.tsi.lv/>;
- The users have an opportunity to access remotely their virtual account and reserve the information resources;
- E-books can be read online or downloaded to the user's device. Books are available in EPUB and PDF formats;
- [A database of works published by TTI lecturers](#) has been established and regularly updated at the university;
- The instructions for using the collection of electronic books and electronic resources in [Latvian](#) and [English](#) are posted on the library's website;
- It is possible to contact the library staff remotely and to ask questions about the use of the electronic books and e-resources;
- The library regularly organizes trainings for academic staff and students to work with electronic resources. In total, 5 such classes were organized in 2022.

Principles of building the library funds:

- In cooperation with the TTI Library Council, a policy of creating the library funds was elaborated; in accordance with the TTI Development Strategy, it determines the priorities of the library funds creation directions;
- At the beginning of the calendar year, the faculties fill out a uniform format of requests for the purchase of the books and e-books, according to which the Library purchases and processes the sources;
- Since 2018, the requests are also accepted for the purchase of electronic books;
- The regular consultations are held with the academic staff and TTI management regarding the renewal and addition of the library funds, including the electronic resources;
- Every year in October, faculties are invited to review the list of subscribed periodicals and put forward proposals for the subscription of periodicals for the following year.
- Information on the latest purchased resources is placed on the TTI library portal and sent out as electronic information to all TTI employees and students;
- Users are regularly offered the trials of scientific databases.

Programme costs

At the Institute of Transport and Telecommunications, the income from the tuition fee is the main source of funding for the study process. The programmes are financed from the financial resources of the individuals and the legal entities. For the academic year 2023/2024, the tuition fee per one full-

time student is 3 500 EUR per year, and for a part - time students – EUR 2 700 per year. The amount of tuition fees for each academic year is determined and approved by the Rector's order. The tuition fee payment procedure is set out by the [Regulations on Tuition Fee Payment Procedure](#), which provides for the possibility of paying tuition fees for the entire study programme as a whole, for one academic year, for one academic semester or as a monthly payment (starting from the 2nd semester). Taking into account the current economic situation in Latvia, the tuition fees have increased for all programmes implemented by TTI compared to autumn of year 2021 when the programme was licensed.

Table 3. Average cost structure in the programme

Cost item	Amount of expenses per 1 student per year (EUR)	Amount of expenses per 1 student per year (%)
Payments of employees' salaries and wages and taxes	1 991,50	56,9%
Other personnel costs (including business trip expenses)	105,00	3,0%
Study programme development and implementation costs	276,50	7,9%
Teaching materials, scientific infrastructure costs and other similar costs	259,00	7,4%
Advertising and marketing costs	444,50	12,7%
Infrastructure costs	339,50	9,7%
IT costs	35,00	1,0%
Depreciation and wear	31,50	0,9%
Interest payments	14,00	0,4%
Other taxes	3,50	0,1%
IN TOTAL	3 500,00	100,00%

An analysis of the cost positions shows that the largest cost positions are salaries and wages and taxes about 57%. In order to reduce the costs, the programme plans to provide only 8 contact hours per CP, but the labour costs of the highly qualified academic staff employed in the programme are very high. The qualifications of the academic staff involved in the implementation of the programme at the doctoral level are as follows: 77% of professors and 11% of associate professors; it is justified, since only staff with such qualifications are entitled to work at doctoral level.

Unfortunately, due to the rapid increase in energy tariffs, the cost of TTI infrastructure has increased compared to the previous years. In line with the TTI development strategy and marketing plan to penetrate the new market regions, advertising and marketing costs have increased significantly up to 12%.

The budget of the Research Department includes funds planned for the promotion of the scientific and research activities of each faculty and its lecturers – for the payment for publications and conferences, exchange trips, international cooperation activities and membership fees. The budget for these purposes is planned on the basis of the development and professional development plan of each faculty and its lecturers. The funds for the expansion of the educational resources, scientific literature and library funds are planned in the Library budget on the basis of orders submitted by Financial Responsibility Centres (FRC), which in turn are in line with the objectives set out in the Financial Responsibility Centres (FRC) development plan.

The resources available for the implementation of the study programme are successfully supplemented by the budgets of the scientific research projects, thus ensuring the current and long-term achievement of the results specified in the study programme.

From a financial point of view, the tuition fees set for each doctoral student are sufficient to cover the full cycle of his/her doctoral studies. The costs of defending the doctoral thesis at the University are covered by separate funds intended for this purpose in the budget of the Doctoral Council.

As can be seen, the provision of the study base, the scientific base, the information base (including the library), the material and technical base and the financial base is sufficient for the successful implementation of the programme.

3.2. During the reporting period, analysis of changes in the composition and qualifications of academic staff and evaluation of these changes (impact on the quality of studies, implementation conditions and compliance with the requirements of regulatory acts)

The composition of the teaching staff has not changed during the reporting period. In order to ensure the qualitative and innovative implementation of the study programme, the doctoral study programme "Digital Economy and Business" includes doctors in Economics and Entrepreneurship, and Engineering, who have publications in the fields relevant to the course, who are involved as project leaders or researchers in the projects corresponding to the profile of the study programme, with pedagogical work experience as a lecturer (associate professor or professor) and experience in supervising the doctoral theses. The list of teaching staff is attached as Appendix 7.

The director of the doctoral study programme and the leading lecturer in charge of the main courses of the programme is Prof. Inna Stecenko. Prof. I. Stecenko has accumulated experience in the field of scientific publications on the topic of innovative development of the countries, she participated in the research project *Participation of small and medium - size enterprises in the implementation of the innovation policy of Taiwan* (2018, National University of Taiwan), as well as in the project *Factors of development of competitiveness and efficiency of the management of small and medium-sized enterprises in the local and global environment* (Czech Republic). From 2023, she is an expert for the UN Environment Programme. She has pedagogical work experience, the doctoral study programme management experience since 2009 (BIA), and she is actively involved in the training of young scientists (in the period from 2015 to 2022, under the supervision of Prof. Inna Stecenko, 9 doctoral students have developed and defended their theses; for two doctoral students, the professor has been a scientific advisor and for other four doctoral students - an official reviewer of the thesis.).

Prof. Irina Jackiva teaches the courses "Methodology of Scientific Research" and "Econometrics" in the doctoral programme. She is a well-known expert in the field of statistical analysis, the developer of the courses "Multivariate Statistical Analysis", "Data Analysis Methods and Business Forecasting" and "Econometrics", the author of six monographs and more than 100 scientific publications, has worked in various projects and managed them: *European COST Action CA16222: Wider Impacts and Scenario Evaluation of Autonomous and Connected Transport (2017-present)*; *European COST Action TU1306: Fostering knowledge about the relationship between Information and Communication Technologies and Public Spaces supported by strategies to improve their use and attractiveness (CYBERPARKS) (2015-2019)*. Under the supervision of Prof. Irina Jackiva, 6 PhD students have developed and defended their doctoral theses in the field of Telematics and Logistics, and she is currently supervising the doctoral theses of two doctoral students.

Prof. Igor Kabashkin teaches the course "Methodology of Scientific Research" in the programme, he is the author of more than 600 educational and scientific publications, has been the leader and

participant of many scientific projects, among them the State National Research Programme "*Next Generation Information and Communication Technologies (ICT) Research National Programme (NexIT)*" project No. 3 "*Applications of Sensor Networks and Signal Processing in National Economy*" (2014-2017); *Intelligent Transport and Traffic Management (IntelTrans)*. Erasmus+ (2020-2022; national coordinator of the project); *Digitally supported and virtual study practices for modern logistic systems (DigiLog)*. Erasmus+ (2018-2020; project national coordinator); *Sustainable urban mobility and commuting in Baltic cities (SUMBA)*. INTERREG Baltic Sea Region programme (2017-2020; expert), etc. Under the supervision of Prof. Igor Kabashkin, 7 doctoral students have elaborated and defended their doctoral theses.

Prof. Irina Kuzmina-Merlino teaches the course "Digital Financial Services" in the programme, she has participated in a number of scientific research projects, including ERASMUS+ *Spread Your Wings Nr. 2017-1-PL01-KA203-038782 project* (18.06.2018.-31.08.2020.), ALLIANCE - *Enhancing excellence and innovation capacity in sustainable transport interchanges. Grant agreement Nr. 692426* (01.02.2016.-31.12.2018.), she is the author of a number of scientific publications and 4 monographs, including *Management Needs in the Society of Digital Transformation. Strategic Imperatives and Trends of Transformations, Monograph, KNEY, Kyiv* (2020), is the head of the Master study programme "Entrepreneurship and Management" at TTI. Prof. Irina Kuzmina-Merlino is the thesis supervisor and 4 doctoral students have defended their doctoral theses.

Prof. Dmitry Pavlyuk teaches the course "Econometrics" in the programme and he has teaching experience in developing and teaching courses such as "Econometrics", "Statistics", "Optimization Theory" and "Business Forecasting". From 2017 to 2020, he implemented the project "*Postdoctoral Research Support*", "*Spatio - temporal modelling of urban traffic using big data*" No 1.1.1.2/VIAA/1/16/112. D. Pavlyuk is the author of numerous scientific publications, including monographs, and acts as a thesis supervisor.

Associate Professor Yelena Popova teaches courses on "Digital Business and Society". She has methodological and pedagogical experience gained, among other things, in developing and teaching the course "Microeconomics" at the Master level. She has developed a number of courses such as "International Economics" and "International Business" and has authored scientific publications in the field of International Economics, as well as participated in the projects *Enhancing Green Economy in 3 Asian Countries* (2018-2021) and *Developing the Model of Smart Economy in Smart City* (2020-2023) and acts as a doctoral students' supervisor.

Professor Mikhails Savrasovs teaches the course "Big Data Analysis for Governance" in the programme. He has pedagogical work experience in developing and teaching such courses as "Enterprise Information Systems", Master level; "Chatbot Desing and Development", Bachelor; "Simulation in Logistics"; Bachelor level, etc. He has participated in the project "*Enhancing excellence and innovation capacity in sustainable transport interchanges (ALLIANCE)*"; "*Institutional capacity development of the Institute of Transport and Telecommunications*"; "*Impact of road traffic on the quality of Bauska urban environment*", etc. He is the author of a number of scientific publications, including monographs, and acts as a doctoral thesis supervisor.

Professor Yulia Stukalina has developed the courses "Strategic Management and Digital Business" and "Contemporary Business Management" for the programme, as well as she developed the course "Strategic Management" for the Master degree programme "Management and Business". She is the author of a number of scientific publications, she acted as the project leader of the *Spread Your Wings 2017-1-PL01-KA203-038782, - ERASMUS + KA2* (01.12.2017.-31.08.2020.) project and she is a member of the steering committee of COST Action CA18236 *Multi-disciplinary innovation for social*

change (03.10.2019.-02.10.2023.). Prof. Yulia Stukalina is the supervisor of the doctoral thesis and under her supervision 1 doctoral student has defended the doctoral thesis.

As it is shown in Table 8 below, 8 of the 9 lecturers involved in the implementation of the programme are experts in their respective field of the Latvian Science Council. Four of them - Prof. Inna Stecenko, Prof. Irina Kuzmina-Merlino, Prof. Yulia Stukalina, Assoc. Prof. Yelena Popova - are involved in the implementation of the programme as lecturers of the courses in the field of Economics and Management Sciences. In order to strengthen the scientific potential of the interdisciplinary doctoral study programme, the courses "Econometrics" and "Big Data Analysis for Management" are taught by the Latvian Science Council experts in Engineering and Technology - Prof. Irina Jackiva, Prof. Mihails Savrasovs and Prof. Dmitry Pavlyuk, adapting the lectures to the tasks of the study programme in the field of Economics and Business.

All the teaching staff involved in the programme are doctors, 78% are professors, 22% are associate professors and there is one visiting lecturer.

All representatives of the academic staff involved in the implementation of the doctoral programme have the doctoral degrees in sciences: in Economics (3), Management (1), Engineering and Technology (4), and significant practical experience in the relevant field. The teaching staff carry out their scientific work in the research areas related to the subject of the taught course of study and/or the topic of the supervised doctoral thesis.

As it is shown above, all academic staff are distinguished by a high level of scientific and pedagogical qualifications and meet the following criteria: a doctoral degree in a field relevant to the course taught; publications in fields relevant to the course; participation in projects relevant to the profile of the doctoral study programme; pedagogical work experience as a lecturer (as an associate professor or professor) and in the field of the supervised doctoral thesis.

During the period under review, the Doctoral Programme actively cooperated with the foreign professors, for example, on June 7, 2022, the *Erasmus* participant Dr. Prof. *Luis Fernández-Sanz* from the University of Alcalá (Spain), President of CEPIS (*the Council of European Professional Informatics Societies*: <https://cepis.org/>) attended the Doctoral Seminar.

Prof. *Mariya Vasilksa* from the World Economic University in Sofia (Bulgaria) delivered a lecture to the doctoral students on the trends of the world economy in the field of digitization on June 11, 2022.

Table 4. Statistical data on the outgoing mobility of teaching staff during the reporting period.

No.	Name, Surname	Scientific Degree	Host University
1.	Inna Stecenko	Dr. oec.	Thomas More University (Belgia) 2022, Genoa University (Italy), 2023, Tashkent State Transports University (Uzbekistan), 2023
2.	Irina Jackiva	Dr. sc. ing	Vilnius Tech (Lithuania) 2022, Emden University of Applied Science (Germany) 2023
3.	Igors Kabaškins	Dr. habil. sc. ing	Kaunas University of Applied Engineering Science (Lithuania) 2022
4.	Irina Kuzmina- Merlino	Dr. oec.	Genoa University (Italy) 2023
5.	Dmitry Pavlyuk	Dr. sc. ing., Ek. zin. kand.	EPITA University (France) 2022, Alkala University (Spain) 2022
6.	Mihails Savrasovs	Dr. sc. ing.	Kaunas University of Applied Engineering Science (Lithuania) 2022

The faculty members involved in the programme have 50 publications indexed in Web of Science and Scopus databases in the period between 2021 and 2023, both in journals and conference proceedings (see Appendix 9), and they are active in presenting papers at scientific conferences:

International Conference on Reliability and Statistics in Transportation and Telecommunication (Riga, Latvia), INTERNATIONAL SCIENTIFIC CONFERENCE BUSINESS AND MANAGEMENT 2022 (Lithuania), etc.

Professor I.Stecencko together with her doctoral students Oksana Skorobogatova and Maftuna Bulyaeva participated in the 5th International Economic Forum "CRISIS AS A STIMULUS FOR CHANGE: PEOPLE. NATURE. ENTREPRENEURSHIP", which took place on June 30, 2022, at the Latvian Academy of Sciences, Riga, with the following presentations:

- “*Digitalization of Labor Relations: Tendencies and Actors*” (together with Skorobogatova. O.)
- “*Incentives and drivers of Uzbek women’s participation in digital business economy*”(M. Bulyaeva)

The academic staff not only actively participate in the conferences, but also take part in their organization. For example, on December 3 and 4, 2021 the international scientific conference "DEVELOPMENT OF MODERN ECONOMIC SCIENCE IN THE CONTEXT OF DIGITALIZATION" was organized in cooperation with the Centre for Ukrainian-European Scientific Cooperation (Ukraine, Odessa), the organizing committee of which included the faculty members involved in the programme implementation.

Professors Inna Stetsenko, Yulia Stukalina, Yelena Popova and Irina Kuzmina - Merlino are on the Editorial Board of the Journal *Green, Blue and Digital Economy* (ISSN Print:2661-5169).

Doctoral students, postgraduate students and faculty members of the Faculty of Transport and Management Sciences actively participated in the round table discussion "Issues and Ways of Digital Economy Development" organized on January 13, 2023. The round table discussion was attended by PhD *Harald Kitzmann* from the Faculty of Social Sciences, University of Tartu, who presented a paper on Issues and Ways of Digital Economy Development - the Management View of Digital Transition; there also participated *Nilusha Erangi Dimungu Hewage (Sri Lanka)* with the topic Development of Digitalization Process in Sri Lanka; the doctoral student *Ethan Boress Kemgou Voptia* participated with the topic Issues and Ways of Digital Economy Development in Sub-Saharan Africa. The aim of this event was to analyse the main factors influencing the process of digitisation of the economy. The following results can be achieved during the course of the study due to such events: expansion of knowledge of the basic principles of functioning of the digital economy and entrepreneurship, economic and political development trends in Latvia, Europe and the world (LO 1); in-depth knowledge and understanding of the role of economic and political research in the development of society (LO 2); to present and explain the results of their research in an argumentative way (LO 6); to discuss the current economic and business issues with both professionals and the public (LO 7).

3.3. In the case of Master or doctoral study programmes, indicate and provide justification whether the awarding of degrees is based on the achievements and findings of the relevant field of science or artistic creativity.

The Digital Economy and Business programme meets the labour market needs and the employment of researchers in the research institutions, as well as scientific trends, and demonstrates a high and steadily growing demand for doctors in Economics and Business.

When admitting the doctoral students to the doctoral study programme, the programme director and the doctoral thesis supervisors keep track of the relevance of the topics to the scientific interests of the EU and to the research projects carried out by TTI.

The doctoral study programme "Digital Economy and Business" is unique – it is the only doctoral programme in the Baltic States and in the EU as a whole that focuses on the digitalisation of both

business and the economy as a whole. The programme meets the requirements of the SDG 17 agenda, OECD recommendations¹⁵, the agenda of the Council of Europe¹⁶, Latvia's policy documents¹⁷, which are generally in line with the needs of the modern world economy.

All teaching staff and the doctoral students involved in the implementation of the programme participate in the international or local scientific conferences.

The doctoral programme includes the study courses which cover the issues related to the implementation of the National Research and Innovation Strategy for Economic Transformation of the National Economy, the Smart Specialisation Strategy (RIS3) in research.

The doctoral students actively support feedback to the experts in the field of digitisation, the public by participating in various public events - for example, round table discussions, industry workshops and seminars, conference sessions.

The degree of Doctor of Science (PhD) in the branch group "Social Sciences" (Regulations of the Cabinet of Ministers No. 595 on Latvian science branch groups, science branches and sub-sectors of the science group) is awarded for the independently developed and publicly defended doctoral thesis which is the original completed research of significant importance in the field of Economics and Business.

The impact of the results on the scientific field is demonstrated by the fact that the applicants for the doctoral degree have:

- reports at international scientific conferences or seminars;
- modern methods of data analysis and data processing have been used within the research.
- at least five anonymous peer-reviewed scientific publications in the indexed international databases, including at least one in an anonymous peer-reviewed scientific journal indexed in SCOPUS or Web of Science and having an Impact Factor (IP) indicator;

For the time being, TTI has not yet been delegated the right to award a doctoral degree in the field of Economics and Business, because in accordance with Article 11 Part 3 of the Law on Scientific Activities of the Republic of Latvia, a higher education institution may submit an application to the Latvian Council of Science to delegate the right to award a doctoral degree if it has an accredited doctoral study programme implemented there, that is, after the doctoral programme "Digital Economy and Business" is included in the accreditation sheet of the study field. Until TTI is delegated the right to award the doctoral degree in Economics and Business, an agreement has been concluded with Turība University of Business, which has been delegated to award the doctoral degree in Economics and Business and which has established the Promotion Council.

At all stages of their training, the doctoral students are involved in the study process that ensures the transfer of knowledge, experience and research results at different levels of education. The results of the research carried out during the doctoral studies are integrated into the Master and undergraduate programmes of the relevant scientific branches, which ensures the integrity of the transfer of knowledge and research at all levels of study.

¹⁵ OECD Reviews of Digital Transformation, Going Digital in Latvia, OECD Publishing, Paris, 2021
<https://doi.org/10.1787/8eecd1828-en>

¹⁶ European Council: Digital sovereignty is central to European strategic autonomy, Press Release, 3 February 2021.

¹⁷ NATIONAL DEVELOPMENT PLAN OF LATVIA FOR 2021-2027, Cross-Sectoral Coordination Center Riga 2020
<https://www.pkc.gov.lv/lv/nap2027>

The doctoral programme is designed to cover all the main research areas of the Faculty of Transport and Management Sciences. The Faculty has defined 4 key strategic areas on which the long-term research objectives of the faculty are based, which can only be implemented through the active involvement of students or graduates in the doctoral study programme "Digital Economy and Business":

- To increase the number of high-quality and internationally recognized researchers;
- To ensure an internationally recognized research process, taking into account the increasing number of publications, research projects, conferences, etc. number dynamics;
- To ensure an efficient research infrastructure by investing in the development of high-quality research infrastructure and providing the comprehensive resources for research;
- To ensure the sustainable innovation, commercialization and technology transfer by fostering interdisciplinary knowledge and technology creation through the establishment and maintenance of the international research partnership; improving the internal and external communication and cooperation.

4. Implementation of the recommendations received in the licensing of the study programme

4.1. Evaluation of the execution of the implementation plan of the recommendations provided by the study programme licensing experts and the impact of the provided recommendations on the quality of studies or the improvement of the processes in the study programme.

In the process of licensing the study programme, the experts made three short-term recommendations to be implemented before the meeting of the Study Qualifications Committee and 7 long-term recommendations to be implemented before the enrolment of students.

One of the experts' recommendations, which was also emphasized by the Study Quality Commission, although leaving the recommendations to the executive of the head of the university, was related to the title of the programme. TSI considers that the title of the programme "Digital Economy and Business" is related to both the programme objectives and the achievable learning outcomes of the programme. Entrepreneurship, as you know, is not just doing business for profit. We perceive it much more broadly - it is a process of transforming the existing *status quo* in society and the economy, solving the most acute problems for society and filling in weak points. To achieve this, it is often necessary to introduce innovative products, services and business process solutions, learn international legislation and practice, as well as learn and conquer new markets.

Therefore, in addition to such a paradigm, an important and new field in business and economics is digitalization processes, which are based on a series of economic issues: public decision-making, national and international policy formation in the field of digitalization. Without addressing these issues, the digitisation processes in business cannot be implemented effectively. Changing the title of the programme to "Digital Business and Society" will significantly limit not only the scope of the doctoral students' research, but also the quality of their research, since business is focused on the interaction between companies and the exchange of goods or services, usually with the aim of making a profit. However, the processes of the digitisation of the economy and society must reflect not only the financial side of this process, but also its essential social aspect, its impact on society and its well-being. This is the reason why the Digital Economy and Business programme was created and developed.

Currently, TTI has not yet been delegated the right to grant the doctoral degree in the field of Economics and Business, since in accordance with Article 11, Part 3 of the Law on Scientific

Activities of the Republic of Latvia, the University may submit an application to the Latvian Council of Science to delegate the right to award the doctoral degree, if the relevant accredited doctoral study programme is implemented there; therefore, after the doctoral programme "Digital Economy and Business" is included in the accreditation sheet of the field of study the university can submit the application to the Latvian Science Council. Until TTI is delegated to the right to award the doctoral degree in Economics and Business, an agreement has been concluded with Turība University of Business, which has been delegated the promotion rights to grant the doctoral degree in Economics and Business and which has established the Promotion Council.

Since TTI has not been delegated the right of awarding the doctoral degree in the field of Economics and Business and it is not possible to create a doctoral council in this field, although the university already has the necessary number of professors and experts of the LSC, an agreement was concluded with "Turība University of Business", which has been delegated the right to award a doctoral degree in Economics and Business and a permanent Doctoral Council in Economics and Business has been established. The study agreement with the doctoral students stipulates the possibility for the doctoral students of TTI to defend their doctoral theses at Turība University of Business.

The experts had recommended to include the study course "Project Management" in Part B or Part C of the programme for students who do not have previous education in Economics or Business. It was not included in the programme as a separate study course. The study course "Project Management" consists of several blocks: project design, promotion strategies, financing and the economic justification of project implementation. These topics are reflected in the following study courses of the doctoral programme: Digital Business and Society (topics: Digital Transformation of Business, Business adaptation to digital transformation); Strategic Management and Digital Business (topics: Strategic Planning Process. Strategy Selection and Management for achieving competitive advantage in the context of the Digital Economy); Digital Financial Services; Econometrics (topic: Empirical project implementation); Contemporary Business Management (topic: Innovation laboratories, science parks and business incubators).

The experts pointed out the fact that it is necessary to clarify how the methods used in the student's research are assessed, since this aspect is not sufficiently clearly described in the submitted programme licensing documents. On September 27, 2022, amendments to the Regulations for Doctoral Studies were approved, applying the norms included in it to both doctoral programmes implemented by TTI. On February 1, 2022, a new form of the study course description was approved by TTI, which also describes the methods and criteria for assessing the learning outcomes in relation to the learning outcomes of the programme.

During the programme licensing process, the experts also made seven long-term recommendations to be implemented before the field of the study is accredited.

1. Within two years, to prepare a plan or strategy for more active involvement of foreign visiting professors and/or lecturers in the implementation of the study programme.

In line with the [TTI Development Strategy 2020-2025](#), lecturers and researchers are the most valuable resource of TTI and should be developed, along with other things, by attracting foreign visiting professors and/or lecturers. This is particularly relevant for the further development of the doctoral programme. Taking into account this circumstance, an action plan has been drawn up which defines the activities aimed both at the development of the existing academic staff (in the context of internationalisation) and the attraction of foreign visiting professors and/or lecturers. The implementation of this plan will not only allow the expansion of the opportunities for the contacts with foreign academic staff, but also to promote both the doctoral programme and higher education in Latvia.

2. Within two years, to conclude a cooperation agreement with the representatives of the business community to involve them more specifically in the implementation of the study programme, in particular

with regard to the provision of external consultants for the doctoral theses. It is desirable to formulate objectives for the activity of external doctoral theses consultants, specific activities to be performed by the involved parties and the performance evaluation criteria, as well as to provide training for the coordinators and external consultants of this activity.

The signed cooperation agreements with the representatives of the business environment are supplemented with the specific action plans, providing for the following activities: consultations of the doctoral students and networking of the doctoral students with industry representatives; participation in research or projects; validation of the research results of doctoral students; preparation of reviews on the doctoral theses, exchange of the obtained research results, etc. There have been concluded the agreements and action plans with Accenture Latvia, Riga International Airport,

If necessary, the scientific advisors from the partner institutions may be invited if the field of research of the doctoral thesis is interdisciplinary, with the aim of ensuring a doctoral thesis research relevant to the industry.

The scientific advisor shall, where appropriate, be familiarised with the established procedures for the award of the doctoral scientific degree and for the elaboration of the doctoral thesis, and with the laws and regulatory enactments regulating the thesis promotion:

- [Law on Scientific Activity](#)
- [Ministra kabineta noteikumi Nr. 595 “Noteikumi par Latvijas zinātnes nozaru grupām, zinātnes nozarēm un apakšnozarēm” \(in Latvian\)](#)
- [Cabinet Regulations No. 1000 “On Delegation of Powers to Confer the Doctoral Degree \(Promotion\) to Higher Education Institutions” \(in Latvian\)](#)
- [Cabinet Regulations No. 1001 “Procedures and Criteria for the Conferral of a Doctoral Degree in Science” \(in Latvian\)](#)
- [TSI Regulations for the award of the degree of doctor of science \(doctoral dissertation\) procedure and criteria](#)
- [TSI Guidelines for the Preparation of Doctor Thesis](#)

If it is necessary and time schedule permits, the consultant may be offered to join the training process of the doctoral students and to listen to topics that introduce the procedure and criteria for awarding the degree of Doctor of Science in the Republic of Latvia and review the scientific, organisational, ethical and regulatory aspects of scientific research that must be observed in the process of developing a doctoral thesis for obtaining the degree of Doctor of Science in Latvia.

3. Within two years, provide in the TTI internal regulations the acts governing the collection of feedback and quality management processes, provide at the level of doctoral studies a permanent feedback collection mechanism for interviews with doctoral students, while ensuring that doctoral students also have the opportunity to provide anonymous feedback and suggestions.

Surveys of students, alumni and employers are held regularly in TTI in accordance with the [Rules for the Organisation of Students’, Alumni’s and Employers’ Surveys](#), which define the procedure for the organisation, conducting and processing of the results of regular surveys of students, alumni and employers in TTI. The purpose of the surveys is to determine the level of satisfaction of students, graduates and employers with the educational services provided by the University in order to use the information obtained as a result of the surveys for further improvement of the study programmes, study process and the achievable study results in the future. The results of the surveys, as well as the recommendations of the faculties, departments and responsible staff on the comments and suggestions made in the students’ questionnaires are summarised in the form of a Corrective Action Plan, which is approved by the Rector's

Order after the surveys have taken place in June. The implementation of the Corrective Action Plan shall be regularly monitored.

The amendments to the Regulations of the year 2021 also provide for the possibility to organise surveys in the form of focus group discussions in doctoral study programmes in order to obtain the independent feedback. Such surveys shall be organised by the programme director at the end of her/his taught course. Digital economy and society. The results of the survey of doctoral students of the Doctoral programme are presented in Appendix 12

4. Within two years, to clarify the cooperation and to conclude an agreement on the establishment of the planned joint doctoral school with a foreign HEI - Lapenranta Technical University (LUT, Finland), while developing an action plan in case the cooperation with this foreign HEI is not continued due to any factors.

The study programme "Digital Economy and Business" continues to develop and cooperation partners are being sought for the establishment of a doctoral school. During the visit of the Director of the study programme, Dean of TLF I. Stecenko to the University of Genoa (17.04.23 - 21.04.23), during the meeting with the Director of the doctoral programme in Economics and the Head of the International Department of the University, an agreement on the implementation of the doctoral programme was reached. An online meeting with the management of the said University is currently scheduled; there should be agreed on the procedure for coordinating and approving the Memorandum of Understanding. The memorandum of understanding is expected to be signed by the beginning of the next academic year.

5. Until the accreditation of the study field, TTI should promote the research by the faculty members in the topics of the doctoral study programme - "digital economy/business/society" and scientific publications in this research field.

All teaching staff of the doctoral programme are actively involved in scientific activity. Research activity is manifested in writing scientific articles, publishing monographs, presenting at scientific conferences, organizing the conferences, as well as in supervising and defending the doctoral theses (see the Faculty CVs in Appendix 8, and the publications of the faculty members in line with the programme's research focus are presented in Appendix 9.

Professor Inna Stecenko participated in the International Conference on Reliability and Statistics in Transportation and Telecommunication (Riga, Latvia), International Scientific Conference in Business and Management - 2022 (Lithuania), etc. in the period from 2021 to 2023. Professor I. Stecenko together with her doctoral students Oksana Skorobogatova and Maftuna Bulyaeva participated in the 5th International Economic Forum "Crisis As A Stimulus For Change: People. Nature. Entrepreneurship" which took place on June 30, 2022 at the Latvian Academy of Sciences, Riga, with the following papers: " *Digitalization of Labor Relations: Tendencies and Actors*" (co-author O. Skorobogatova), "*Incentives and drivers of Uzbek women participation in digital business economy*" (co-author M. Bulyaeva)

Professor Inna Stecenko has also participated in several international conferences. She presented the paper "Assessment of factors affecting the digitalization of the economy in Latvia" in the plenary session of the IX International Scientific and Practical Conference "Enterprise Economics: theory and practice" (October 12-13, 2022, "KYIV NATIONAL ECONOMIC UNIVERSITY NAMED AFTER VADIM HETMAN"). She also participated at the International Conference on Reliability and Statistics in Transportation and Telecommunication (Riga, Latvia 2021), International Scientific Conference in Business and Management - 2022 (Lithuania).

Together with the co-author Prof. Y. Stukalina, Prof. I. Stecenko participated with the report "Assessment of the Factors Influencing the Digitalization of Economies in the Baltic States" in an international online round table discussion: "WOMEN IN SCIENCE AND EDUCATION OF THE XXI CENTURY: ACHIEVEMENTS AND PROBLEMS" (11.02. 22) in Tashkent, Uzbekistan; she also presented the paper "Digitalization of the economy and the role of the women in the Baltics" at the international conference "Engaging young women and girls in research activities: best practices and prospects" (Tashkent, 2022).

During the analysed period (07.07.22.) a doctoral thesis in Economics and Entrepreneurship under the supervision of Professor I. Stecenko was defended at Riga Stradiņš University.

Professor Irina Kuzmina-Merlino published article Modern Managers in Gig Economies: Competences, Personality and their Effect on Manager Education in the Digital Era. (co-author K. Užule, (2022)), and in 2022 presented a paper Artificial Intelligence Techniques for Automating Management and Leadership Tasks: Literature Review (N. Dolle) at the Reliability and Statistics in Transportation and Communication.

Professor Irina Kuzmina-Merlino published the article Modern Managers in Gig Economies: Competences, Personality and their Effect on Manager Education in the Digital Era. (co-authored with K. Užule, (2022)), and in 2022 she presented a paper Artificial Intelligence Techniques for Automating Management and Leadership Tasks: Literature Review (N. Dolle) at the Reliability and Statistics in Transportation and Telecommunication conference. Together with co-author N. Dolle, T., the publication Centralization of a Company's Cash Management and Leadership Using Digital Techniques prepared for Hösle. In 2022, under the supervision of Professor Irina Kuzmina-Merlino, a doctoral dissertation in Economics and Business. was defended by a RISEBA doctoral student.

Profesore Yulia Stukalina piedalījās International Scientific Conference Business And Management 2022 (Lithuania) , kur uzstājās ar referātu "Assessment of the Factors Influencing the Digitalization of Economies in the Baltic States" (līdzautore prof. I.Stecenko); sagatavoja referātu Business Digital Transformation in the Data-Driven Economy: Enhancing Value With Ai Services (līdzautore Olga Zervina), 13th International Scientific Conference „Business and Management 2023“, Vilnius Gediminas Technical University May 11 – May 12, 2023, accepted for proceedings (WoS)

Profesore Yulia Stukalina iesaistīta projektu īstenošanā : Cost Action ca19102 Language in The Human-Machine Era (06.10.2020. –05.10.2024), Cost Action ca18236 Multi-Disciplinary Innovation for Social Change (03.10.2019. –02.10.2023.). Profesores vadībā TSI aizstāvēts viens promocijas darbs (05.12.22)

Professor Yulia Stukalina participated in the International Scientific Conference in Business and Management - 2022 (Lithuania) , where she presented a paper "Assessment of the Factors Influencing the Digitalization of Economies in the Baltic States" (with co-author prof. I.Stecenko); she prepared a report Business Digital Transformation in the Data-Driven Economy: Enhancing Value With AI Services (co-author Olga Zervina) for the 13th International Scientific Conference "Business and Management 2023", Vilnius Gediminas Technical University May 11 - May 12, 2023, accepted for proceedings (WoS)

Professor Yulia Stukalina is involved in the following projects: Cost Action ca 19102 Language in The Human-Machine Era (06.10.2020. - 05.10.2024.), Cost Action ca 18236 Multi-Disciplinary Innovation for Social Change (03.10.2019. - 02.10.2023.). One doctoral thesis has been defended in TTI under the supervision of Professor Yulia Stukalina (05.12.22)

Asociētā profesore E. Popova 2020. līdz 2023. gadam aktīvi iesaistās zinātniskajā darbībā, no 2018. - 2021. gadā viņa īstenoja projektu " Enhancing Green Economy in 3 Asian Countries ".

No 2020. līdz 2023. gadam viņa ir projekta "Development of model of smart economy in smart city" pētniece. Ir vairākas publikācijas viedās pilsētas jomā, piemēram: Impact of Smart Economy on Smart Areas and Mediation Effect of National Economy/ Sustainability (Switzerland) 14(5),2789 (līdzautors Popovs, S) 2022, Popova, Y (2022) Factors Affecting the Growth of Demand on Carsharing Services Within Smart City, publikācija žurnālā Transport and Telecommunication (līdzautors Fesyuk, A.) u. c. J.Popova aktīvi iesaistās doktorantu sagatavošanā.

Profesores Inna Stecenko, Yulia Stukalina, Jeļena Popova un Irina Kuzmina-Merlino ir žurnāla *Green, Blue and Digital Economy* (ISSN Print:2661-5169) redkolēģijā.

Tādējādi redzams, ka doktora programmā iesaistītajam akadēmiskajam personālam ir augsts zinātniskais potenciāls, tas ir iesaistīts starptautiskā zinātniskā vidē, kā arī uztur zinātniskās un pedagoģiskās saites ar Latvijas augstskolām.

Associate Professor J. Popova is actively involved in the research activities from 2020 to 2023, from 2018 to 2022 she implemented the project "Enhancing Green Economy in 3 Asian Countries".

From 2020 to 2023 she is a researcher of the project "Development of Model of Smart Economy in Smart City". She has several publications in the field of Smart City and smart solutions in Scopus and WoS, in total, 8 articles in Q1, 3 articles in Q2, and one article in Q3: Economic or Financial Substantiation for Smart City Solutions: Literature Review. *Economic Annals-XXI*, 2020, Volume 183, Issue 5-6, Economics, Econometrics and Finance, h-17; Decision-Making within Smart City: Waste Sorting. *Sustainability* 2021, 13, 10586. (Q1, Planning and Development. Cite Score 5.0; Impact Factor 3.889; JCR 0.65, h-109) (co-author Sproge, I.); Economic Basis of Digital Banking Services Produced by FinTech Company in Smart City. *Journal of Tourism and Services*, 23(12), 86-104 (AIS quartile: Q1, JCI 1.64, Rank by the Web of Science Journal Citation Indicator Q1, Scopus CiteScore rank 23/137 Q1); Impact of Smart Economy on Smart Areas and Mediation Effect of National Economy, *Sustainability* 14 (5), 2789 (co-author Popov, S., Q1, Planning and Development. Cite Score 5.0; Impact Factor 3.889; JCR 0.65, h-109); UTAUT Model for Smart City Concept Implementation: Use of Web Applications by Residents for Everyday Operations. *Informatics* 2022, 9, 27. (co-author Zagulova D., Q1, Communication; Cite Score 4.8; JCR 0.53); Aspects of E-Scooter Sharing in the Smart City. *Informatics* 2022, Volume 9, Issue 2, 36 (co-author Zagulova D., Q1, Communication; Cite Score 4.8; JCR 0.53); Factors Affecting the Growth of Demand on Carsharing Services Within Smart City, publication in *Transport and Telecommunication*, 2022, (co-author Fesyuk, A., Q2 Engineering; h-16; Cite Score 2.9; SJR 0.254; SNIP 1.001; JCI 0.26); ICO as Crypto-Assets Manufacturing within a Smart City. *Smart Cities* 2023,6, 40–56. (co-author Cernisevs, O., Q1 Urban Studies; Cite Score 5.5; JCR 1.01); Smart City: Sharing of Financial Services. *Social Sciences* 12 : 8. (co-author Cernisevs, O., Q1 General Social Sciences; Cite Score 3.4; JCR 1.07); Effects and Externalities of Smart Governance. *Smart Cities* 2023, 6, 1109–1131 (co-author Popovs, S., Q1 Urban Studies; Cite Score 5.5; JCR 1.01); Review of Some Applications of Unmanned Aerial Vehicles Technology in the Resource-Rich Country. *Applied Sciences*, 11 (21), 10171. (in co-authorship, Q2, Engineering, Multidisciplinary, Cite Score 3.7; Impact Factor 2.838; JCR 0.61, h-101); Analysis of the Correlation between Mass-Media Publication Activity and COVID-19 Epidemiological Situation in Early 2022. *Information* 2022, 13, 434 (in co-authorship, Q2 Information Systems Cite Score 4.2; JCR 0.62, h - 62). During this period, J. Popova J. Participated in the Reliability and Statistics in Transport and Telecommunication conferences with 5 presentations, including the participation in plenary session in 2022. At current moment she has reviewed 16 papers for Q1 and Q2 scientific journals. Popova is actively involved in the training of PhD students.

Professors Inna Stetsenko, Yulia Stukalina, Jelena Popova and Irina Kuzmina-Merlino are on the editorial board of the journal *Green, Blue and Digital Economy* (ISSN Print:2661-5169).

Thus, it can be seen that the academic staff involved in the doctoral programme implementation have a high scientific potential, are involved in an international scientific environment, and also maintain the scientific and pedagogical links with Latvian universities.

6. Until the accreditation of the field of study, to assess the financial possibilities or find other solutions to provide students with access to the second most common indexing database, Web of Science.

TTI's students have access to the indexing and citation database Scopus through the Ministry of Education and Science of the Republic of Latvia. Until 2019, access was granted only to the public universities and institutions, however, from 2020, access was also granted to the largest private universities, including TTI.

The Ministry of Education and Science of the Republic of Latvia is also responsible for the acquisition of licences for the Web of Science database and for ensuring the centralised accessibility. Unfortunately, for the time being, access to it is provided only to the state universities and scientific institutions, not to private ones. However, TTI students who need access to Web of Science can use it at the Latvian National Library of Latvia by becoming its users.

TTI doctoral students take the opportunity to participate in seminars on the use of databases organised by the Library of the University of Latvia, for example, the seminar "Web of Science in practice: from research planning to evaluation of results", held in English on April 20, 2023. The recommendation will be implemented as soon as the opportunity arises.

7. Until the accreditation of the field of study, consider the possibility of concluding a cooperation agreement referred to in criterion 2 of Requirement V with another HEI implementing a study programme in the field of study "Management, Administration and Real Estate Management" that corresponds to the doctoral study programme to be licensed.

Recommendation fulfilled. Annexe 3: Agreement with BAT and Annexe 2: Model Study Agreement.

APPENDICES

1. Sample diploma to be issued for completing the study programme
2. Sample study contract
3. A document certifying that the university or college will provide students with opportunities to continue their education in another study programme or at another university if the implementation of the study programme is interrupted - Agreement with University of Business Turība (BAT)
4. Study programme plan for all forms and types of study programme implementation
5. Mapping of study courses
6. Descriptions of the study courses
7. Basic information about the teaching staff involved in the implementation of the study programme, indicating their degree/ qualification, election status at the university, study courses in the implementation of which they participate and proof of knowledge of the national language and a foreign language.
8. CV of teaching staff
9. Certificate from the university about the English language proficiency of the teaching staff involved in the implementation of the study programme at least at the B2 level according to the levels of the European Language Proficiency assessment and the Latvian language proficiency.
10. Scientific publications of academic staff during the review period
11. Compilation of quantitative data on scientific research activities of teaching staff during the reporting period
12. Review of the implementation of recommendations.
13. Survey results
14. Decision of the Senate on the accreditation of the "Digital Economy and Business" programme
15. Statistical Data on Students of the Study Programme "Digital Economy and Business"
16. Confirmation that the academic staff of the academic study programme meet the requirements set out in Article 55(1)(3) of the Law. Universities
17. Confirmation that the academic staff of the doctoral study programme includes not less than five doctors, at least three of whom are experts approved by the Latvian Council of Science in the field or sub-field in which the study programme intends to award a scientific degree
18. Confirmation that the scientific and pedagogical qualification of doctors of science complies with the criteria specified in regulatory enactments regarding the evaluation of scientific and pedagogical qualifications of professors and associate professors